Factors affecting reading comprehension in primary pupils

Thesis

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FACTORS AFFECTING READING COMPREHENSION IN PRIMARY PUPILS

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by

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NOTE ON ABBREVIATIONS USED

PIV – Primary 4 (Eight year olds in the Scottish System of Education).

PV – Primary 5 (Nine year olds in the Scottish System of Education).

PVI – Primary 6 (Ten year olds in the Scottish System of Education).

PVII – Primary 7 (Eleven year olds in the Scottish System of Education).

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DECLARATION

I declare that this thesis is a record of my own work except where specifically indicated. Sources of information have been acknowledged throughout and verbatim extracts distinguished by quotation marks. This thesis has not been submitted for any previous degree and parts previously published have been noted in the text.

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EX12

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ABSTRACT

This thesis addresses the problem of 8–11 year old pupils who, although appearing to read text fluently, frequently misunderstand it. This problem was studied through Scottish school–based research using classroom materials and subjects from natural class groups. Data were collected from language assignments in daily work programmes, with response material in either written or illustrated form. Nine feasibility studies and a main study involving eighty subjects were carried out.

The effects of five variables, text, presentation mode, age, ability and geographic location, on the totals and types of miscomprehensions displayed by the subjects in directed and free–recall comprehension tasks were calculated. 'Errors' are considered to be divergences from the author's supposed meaning. It is found that the collected errors are not random but may be classified into groups. Ten types of error were identified as regularly occurring and the category system developed was validated by teachers and others involved in the field of education.

The effects of the five variables on the numbers and categories of error collected and the interactions between these variables were subjected to statistical analysis. Text and presentation mode are found to be the factors having most effect on the quantity and type of error produced. This finding is at variance with the generally

accepted assumption that age, ability and possibly environment are determinants of potential pupil achievement. Miscomprehensions are discovered to be widely distributed across the ability range but they may be concealed by pupils in their pursuit of acceptable responses. The progress expected with increasing age is not always evident.

The value of the category system as a teaching tool in comprehension development across the curriculum and pupil age range is assessed and suggestions given for its use. Implications of the findings for pupil assessment procedures and classroom practice are also discussed.

CHAPTER 1

Introduction

1.1 THE PROBLEM

'Comprehension' is a word in frequent use in the teaching of English in schools but although teachers use it frequently, the term is difficult to define. From differing viewpoints it may be seen as perceiving or extracting the meaning, inferring from information received, or knowing how to proceed. There is an assumption made both in teaching and in life generally that we have a clear idea of what is meant by 'understanding' but that again depends on whether the word is being considered from a philosophical, linguistic or psychological angle.

Because of this difficulty of definition, comprehension of language is difficult to assess. Nevertheless with the introduction of the National Curriculum in England and Wales and the publication of consultative documents outlining a Policy for Education in the Nineties in Scotland, assessment in the classroom is currently a focus of special attention. In this context it is particularly important to study the meanings that children construct from text and how these tally with what they understand or are expected to understand, and with what teachers take to be the intended meaning.

Text in this study is defined as printed material. We do not have very full knowledge of how well pupils understand texts or how they reach their understandings and misunderstandings. Teachers make judgements about what children do or do not understand but we do not know how accurate is the match between teachers' and children's assumptions about comprehension, nor exactly

what developmental trends or other factors may affect the outcomes. These are the problems, viewed from the perspective of cognitive psychology, that are tackled in this thesis.

Many pupils have difficulty in the comprehension of text. Although they have mastered the basic reading skills and appear to read quite fluently, many experience considerable difficulty in extracting the writer's intended meaning from the printed word, e.g. confusion of 'plain' with 'plane which flies' and of 'purchase' with 'purse that you keep you money in'. The present author encounters many such examples of reader confusion in work in learning support and listens to teachers concerned that, having mastered the initial stages of learning to decode, many pupils seem to fail to develop and extend these skills to cope with the primary curriculum. Having learned to read, many pupils fail to become readers from choice, and so do not experience books as a source of enjoyment and relaxation and miss as well a means of extending their knowledge. If the only reading that pupils do is that directed by the teacher as part of the curriculum, their potential achievement in academic terms may be limited. Moreover, failure to learn from textual content has important implications for achievement in secondary school and later.

This present research arose from a previous dissertation '*The Effect of Textual Type and Prior Knowledge on Comprehension in Seven Year Old Pupils, with Implications for Remedial Specialists*' (MacMartin, 1983) on the effect of textual type and prior knowledge on comprehension of seven year olds. It is at this stage

that demands on reading ability begin to increase rapidly and comprehension problems become apparent. The earlier study explored the effects of narrative, imaginative and factual passages on the free recall of average readers at seven years. It also assessed the effects of prior knowledge, structure and content on the recall of these texts, and attempted to identify the textual factors which affect retrieval of information by young readers in their third school year.

Scrutiny of the results of this earlier study indicated the type of re-organisation and inference which might have taken place, the importance of position of informational units in text as an influence on recall, and the types of comprehension strategy possibly employed by readers. In interpretation of the results, the relative influences of previous experience, interest, salient information, predictability, readability, syntactic and semantic complexity and cognitive strategies on protocols, were discussed. Organisational processes, e.g. paraphrasing and summarisation, involved in recall were also reviewed.

Although generalisations cannot be made from the small number of children studied, the study appeared to suggest that semantic structure and level of inferential processing are the factors which most influence comprehension as measured by free recall in verbal and pictorial form in this age group.

1.2 THE PRESENT STUDY

The present study set out to extend the investigation across the higher age groups

in the primary school, i.e. 8–12 years, and was initially interested to discover whether similar results to those of the previous study would be found.

While investigating the problem and observing pupils at work in classrooms in the course of learning support work, the author noted that misunderstandings appeared to be much more widely spread than was realised and that they appeared across age and ability groups. In general, it was hypothesised that they were not caused by difficulty with vocabulary or textual structure but by what the pupils brought to the reading task. In broad terms this may be seen as an effect of previous knowledge and experience and established reading techniques. Factors intrinsic to the text appeared to give rise to fewer miscomprehensions.

The concern of this thesis is with texts and the type of misunderstandings found as children encounter them under normal classroom conditions. It is a study made in the actual situation in which teachers sense that children have problems of understanding.

1.3 CURRENT TEACHING PRACTICE

Although teachers sense the problem, ongoing classroom assessment generally does not show it up. The conventional methods used by teachers to assess pupil comprehension include standardised tests, cloze texts, interpretation exercises, direct questioning and summaries which may be oral or written. Over time pupils develop strategies by which they can fairly successfully give back the answer that

the teacher wants. Common examples of effective strategy are skimming and scanning for key words and phrases (Neville, 1988), arrangements of these into plausible answers and shuffling questions into response patterns (Brown & Day, 1983). Absorbed knowledge of sentence structure permits these techniques to appear successful on many occasions when they mask serious misunderstanding. With adequate knowledge of sentence structure, nonsense words can be manipulated into answer form, as has frequently been demonstrated using the poem 'Jabberwocky' (Carroll, 1871).

The result of these strategies is that across both age and ability groups, pupil responses to reading tasks frequently display an apparent understanding but one that is often found by probing to be misleading. More able pupils become so skilled in application of those techniques that their misunderstandings are disguised behind apparently adequate answers. Their answers, perhaps because of teacher expectation, are often seen not as indications of misunderstanding, but as slips of the pen, or examples of creativity. Consequently, their wrong answers may not receive further investigation by the busy class teacher and because of well-developed answering strategies their problems may not be picked up by conventional assessment measures. Standardised tests, textbook comprehension tasks and perhaps even teaching methods do not give much attention to mis-comprehension or partial comprehensions and their possible causes and consequences. Comprehension is taken to mean grasping the meaning the author intended to convey in printed text and miscomprehension, failure to do so.

1.4 ISSUES RAISED FROM PREVIOUS RELEVANT RESEARCH

When reading around the subject to assess possibilities for design of this study, a number of areas which seemed especially relevant to the problem were considered and were influential in shaping the development of the thesis. In general terms these were, reading processes, sources of reading problems, and methods of assessment of reading comprehension. The issues raised in these areas are as follows.

1.4.1 *APPREHENSION OF MEANING*

There has been much debate amongst researchers as to whether reading ability is a composite global skill built up according to developmental level and reading level, through the stages of primary, intermediate and higher order skills which range from decoding to competency (Rost, 1989; Smith, 1978). One version of this view holds that even young readers can apply higher order skills such as inference to many texts which they can read. An alternative view is that the reading process develops through a hierarchy of skills which can be individually practised to advance competency, with some skills making a greater contribution to the reading process than others (Davis, 1968; Andrich & Godfrey, 1978). The extraction of meaning from printed text is such a complex process that these alternative views may overlap and development of skill in comprehension be seen to be partly due to increasing competence in component skills and to an interaction between reading level of text and its relationship to the reader's developmental

level and personal interests.

Another aspect of reading much studied by researchers is the method by which it is taught. Over the years various approaches have been promoted, often to be discarded in favour of others. There is continued debate about the relative merits of structured reading schemes and 'real books' as a means of teaching children to read. Phonic approaches, 'look and say', a sentence method sometimes deemed to be based on Gestalt theory (Navon, 1977), dictated language experience, initial teaching alphabet and colour coding methods have all had supporters and critics. A popular approach, currently, is paired-reading which emphasises context and experience of stories, as a way of developing reading skill by exposure in a similar manner to that in which language is initially acquired.

1.4.2 *SKILLS INVOLVED IN READING*

The process of extracting the author's intended meaning from printed text has been viewed from many standpoints by researchers. It has been studied as a problem-solving activity portraying the reader rather like a detective amassing evidence from available clues, to reach a solution (Goodman, 1967; Schallert, 1982). It has been thought of as being derived from accurate study of the grammatical structure of the text, requiring attention to deep as well as surface meaning (Chomsky, 1957) and in contrast as a constructive activity bringing personal thoughts and world knowledge to bear on the printed word, (Bartlett, 1932; Frederiksen, 1975). Yet another view is that comprehension is an active, information-processing activity

by which a mental representation is built up to reflect the semantic structure of the text (Graesser, 1981). A more encompassing definition is that given by Lunzer & Gardner (1979) who explained comprehension as the ability "to penetrate beyond the verbal forms of text to the underlying ideas, to compare these with what one already knows, and also with one another, to pick out what is essential and new, and to revise one's previous conceptions" (p. 38).

1.4.3 *SOURCES OF READING PROBLEMS*

The source of a reading problem can lie in the reader, in the text, or in the interaction of the two. Problems brought by the reader may be physical such as visual or auditory weakness. They may be environmental in origin, for example socio-economic or language disadvantage. Other difficulties may have emotional, cognitive, developmental or attitudinal causes, or may result from an inappropriate match of pupil's preferred learning style and teaching material.

Difficulties arising from the text may be physical in origin, involving typescript and layout, or contextual, covering interest, vocabulary, and organisation at semantic and syntactic levels.

1.4.4 *ASSESSMENT OF READING*

The methods by which reading ability and comprehension are generally assessed by researchers and teachers can be divided into two main types – formal and

informal. Formal methods involve standardised reading tests which may assess decoding skill, comprehension of words and sentences, or comprehension of connected discourse. Informal methods cover reading inventories, cloze texts, oral reading with questioning, interpretation exercises, summaries – either free recall from memory or with reference to the text, multiple choice responses and illustration by diagram or drawing.

1.5 AIMS OF PRESENT STUDY

The main aim of this thesis is to study the encounter of child and text in independent reading in the classroom situation, in an attempt to discover sources of miscomprehension. Analyses of the results of these encounters, it is reasoned might isolate factors which impede understanding and hinder progress, and these could be used as a basis for teaching material.

After initial observation of pupils' work and study of relevant research, the following questions were formulated:

a. Does the main source of comprehension error lie in the reader, the text, or the interaction of the two?

b. Can comprehension errors be classified into relatively discrete categories?

c. Are children's comprehension errors affected by such factors as age, ability, the location in which they live, type and difficulty of textual material and the way in which the task is presented.

d. Do the findings have implications for teaching practice?

This thesis is an attempt to provide answers to these questions so that some practical help may be given to teachers in their efforts to improve primary school children's comprehension of text.

1.6 STRUCTURE

The structure of the thesis takes the following form. There is firstly a literature review covering various aspects of reading comprehension and a survey of research findings which have a bearing on the present study. From this background reading, possible angles from which this research could be pursued, were selected and a series of feasibility studies carried out. Through these the particular problem covered in this research was explored and the results used to develop a design for the main study.

For the main study the only materials used were excerpts of text from actual books found in classrooms for information or recreation. These texts were studied in the normal classroom situation and results recorded mainly in the form of written or illustrated free recall with or without further access to the text.

The focus of the study overall is the encounter of the child with text in independent reading in the classroom situation. The results of these encounters are studied and analysed in the attempt to isolate factors which impede understanding

and hinder progress, so that they might be used as a basis for teaching material. 'Errors' of comprehension made by the pupils are grouped into categories of similar type and analyses of the results show trends of development, effects of location, age, ability and the influences of presentation modes, and individual texts.

Finally the implications of the findings of the thesis for general teaching practice and for the class teacher struggling to improve pupils' comprehension of text, are discussed.

CHAPTER 2

Research Relevant To The Comprehension Problems Of Primary School Pupils

2.1 PROBLEMS OF ASSESSMENT

Comprehension of written text is a complex process and difficulties experienced by some primary school pupils may arise for many different reasons. These may be textual, cognitive, developmental or environmental. Current thinking on these topics as it relates to the problems experienced by these children in extracting the author's intended meaning from printed text, is presented in this chapter. The present research is based on this survey of the literature together with ideas and information collected in the course of classroom work and from observation of current teaching practices across a range of school types and across varied age-groups of pupils.

Most methods used by teachers in the assessment of comprehension, compare the textual input with some form of output on the part of the pupil. The degree of equivalence in content and idea between the teacher's view of the input, and the output protocol, is generally taken as the measure of understanding reached by the pupil. The methods of assessing comprehension in general use in primary schools are cloze texts, standardised tests and 'interpretation' exercises where pupils answer questions on passages they have read. These assessment techniques may be designed to measure a comprehension skill such as vocabulary, and identification of main idea, and cover differing types of comprehension such as literal, or inferential. These measures may sometimes fail to pick up fairly serious misconceptions on the part of the reader as to the author's intended message. The reader's processing of the text cannot be directly observed but output gives an

indication of these factors which may affect the reader's construction of textual meaning. These factors may be in the text, in the reader, or in the interaction of the two. They may also be in the context of the reading situation e.g. for leisure or for information.

Some of the factors which lie in the text and may influence comprehension include cohesion, textual structure, level of difficulty, and methods of presentation and recall. Ability to decode, understand, form mental images, infer, hold in memory, recall and summarise, environmental effects, personal characteristics, developmental effects, influence of experience, and attitude to reading can also affect the way the reader interprets a text.

Each reading situation involves a reader and a text. When the reader interacts with a text, he or she encodes material for further processing, for immediate or delayed retrieval, or merely to retain in the memory store, as world knowledge for possible future use. The product of the reader's interaction with the text is a personal reconstruction of all or part of the author's intended message. This reconstruction is shaped both by individual factors in the reader, brought to bear on the printed discourse, and textual factors which influence the decision making processes of the reader (Siegel, 1983). Golden and Guthrie (1986) suggested that meaning lies somewhere between the reader and the text. In this review textual factors are first discussed and then the individual characteristics which the reader may bring to the reading situation, are examined.

2.2 TEXTUAL FACTORS WHICH MAY AFFECT READING OUTCOME

Text in this thesis is taken to mean printed material and the examples used are those which pupils may encounter in the primary classroom. Text has been defined as "utterances longer than a sentence", (Pugh, 1981) although many other definitions have also been offered, by no means all relating to written or printed language. For comprehension of text, the sentences must be assimilated into unified structures. Although children may read each sentence carefully and understand it, they may fail to integrate them to realise the meaning of the complete passage. Markman (1979) and Meyer *et al.* (1980) thought a collection of unrelated facts presented as a summary was caused by the failure of the reader to follow the organisation of a text. Halliday & Hasan (1976) define text as 'any passage, spoken or written, of whatever length, that forms a unified whole'. They further define it as having cohesion and register. Researchers have studied the textual factors which may contribute to this incomplete integration, from various perspectives.

2.2.1 *TEXTUAL TYPES*

Graesser *et al.* (1980), classify texts into four basic types – description, exposition, narrative and persuasion. They state that narrative types of prose are likely to be better held in the memory as they are more concrete, and arranged in causal and cohesive sequences. Descriptive texts are often more abstract and not necessarily

arranged in such simple sequential order. Kintsch (1982) agrees that text type plays a significant role in influencing the strategies used in comprehension. Kintsch also points out that informative text generally has longer and more complex sentences than the more imaginative narrative text, a factor which can affect the comprehension processes. In the primary school, most early reading material is narrative in form with the quantity of informative material increasing as the pupils move towards the upper primary levels. By the top primary classes considerable variety of text type and format is generally in use as reading material. As pupils across the age range are familiar with that material in the classroom, narrative text has been chosen for the current research.

2.2.2 *COHESION*

According to Halliday & Hasan (1976) the way in which sentences form text is by the use of cohesive ties. These are the linking devices which transform individual sentences into coherent passages of print. They draw attention to the different types of cohesion and their uses in the construction of integrated text. The parts played by the main types – reference, substitution, ellipsis, conjunctions and lexical cohesion, are fully explained by them. The forms of reference are anaphoric – backward acting or cataphoric – forward acting. Substitution involves the use of such words as 'one', in place of an actual word previously used, while ellipsis avoids repetition by leaving words to be understood from the context. Conjunctions are simply 'joining' words as in the well known grammatical classifications for parts of speech. Lexical cohesion is achieved by use of

vocabulary e.g. by using synonyms, or repeating words. The register of the text is explained by Halliday & Hasan as its tone, mood and selection of words and sentences for its purpose. Zabrucky & Moore (1989) found that the ability to integrate information across sentences, was the latest to develop and was becoming established only by sixth grade.

Mulholland & Neville (1989) found that pupils were better able to treat texts as coherent wholes when the presented material was narrative rather than expository in form. They also found that the ability to handle textual structure within sentences and the connecting links, whether explicit or inferential between sentences, increased with age. Black & Bower (1979) emphasised the importance of cohesive relationships in the production of meaningful stories, while Black & Bern (1981), demonstrated the particular values of causal relationships, as an aid to free recall, pointing out that both memory and reading speed results show the effects of referential cohesion in understanding of text. Black & Bern (1981) found that a causal link between two sentences facilitated recall of the second. Carpenter & Just (1977) take a global view of the comprehension process and emphasise the integration and cohesion of the entire text as a factor in reaching understanding, because the meaning of a passage does not lie in the sum of its individual parts.

One of the main problems which primary school children have in reading comprehension appears to be integration of sections of text as whole units. Attention appears to be frequently given to single sentences and isolated words

instead of the general textual meaning. Comprehension errors occur because of this focus on fragments and failure to understand the cohesive links within a text. The developmental aspect of this failure to make use of inter–sentence connections and the problem of integration of textual information into unified 'wholes' are especially relevant to this present research.

2.2.3 *TEXTUAL STRUCTURE*

2.2.3.1 Macro and Micro Structure

Connected discourse is described by Van Dijk (1977) in terms of macrostructures and microstructures. The macrostructure of a text is its global meaning, topic or theme, while the microstructures are the building bricks – the propositions or fragments of sentence – from which the scaffolding of the macrostructure is composed. Kintsch & Van Dijk (1978) theorised that the macrostructure or gist of a passage was what was contained in a correct summary.

2.2.3.2 Propositional Structure

Kintsch *et al.* (1975) introduced propositional analysis as a method of measuring the semantic complexity of prose by breaking it down into propositions. Propositions correspond to clauses and are further sub–divided into triples which are small units of text carrying meaning in the same way as morphemes are the meaningful units within words.

Propositional analysis is a network or formal mathematical structure of points and links. As an objective measure of text construction, the propositional analysis system is useful but it makes no allowance for previous knowledge and its very grammatical form and vocabulary – subject, verb, object, reason, analysis etc, make it appear to rely heavily on syntax. The system only allows for analyses of the material actually 'given' in the text and does not consider 'new' information brought to the interpretation from the reader's previous knowledge. Sometimes grammatically complex and involved sentences such as those with many clauses and therefore many propositions, do not convey so much meaning as an epithet or poetical extract. It would be difficult to indicate the semantic richness of the latter via propositional analysis, without adding the many previously stored associations which make it meaningful.

Kintsch & Vipond (1979) assumed that an important factor in text comprehension, is the number of propositions that can be held in working memory while Kintsch & Van Dijk (1978) suggested a levels effect in information–processing, caused by giving more attention to propositions high in the hierarchy of memory structure. Meyer (1984) supports a levels effect, the top level being the overall arrangement of the text. The second level is the paragraph level which involves the logical grouping of sentences, while the first or lowest level is that of the sentence and the cohesive ties between sentences. This description of textual structure is very similar to the analysis of discourse into macro and microstructures.

2.2.3.3 Syntactic and Semantic Structures

Discourse has semantic and syntactic dimensions. The syntactic aspect is concerned with the word order and grammatical sequences in the text and their relationship. Kaplan (1975) sees the semantic component of the text as determining the sequence and connection of the topics of a passage, and the syntactic aspect is concerned with the word order and grammatical sequences in the text and the relationship between them. The semantic component of comprehension involves the gist and relationships between the themes in the text and also draws on that part of the reader's previous knowledge which is called upon to aid the comprehension process. The actual syntactic form of the text composed of words, clauses and sentences, is not held for long in the memory, but the semantic content can be stored and retrieved to convey to a greater or lesser extent, the gist or meaning of the passage. Kaplan (1975) sees the syntactic component of the text as determining the logical relationships between the words of a sentence, and the semantic component providing a meaningful interpretation of phrases encountered in syntactic processing. Syntax and semantics are therefore interdependent.

Kaplan emphasised the syntactic aspect of text in outlining a model of comprehension which included the reader's linguistic knowledge and the cognitive processes which apply it to individual sentences. Kaplan's framework was an imaginary computing device which interpreted the reader's abstract linguistic knowledge and applied it to input. It was called 'The Augmented Transition

Network' but as he pointed out, the syntactic dimension on which it was focused, is only one part of the comprehension process.

Quillian (1969) was the first to model semantic memory as a network, as part of a computer program, and his model was the basis of much subsequent research. Various possibilities for the representation of statements by linking together the parts of speech contained therein, by means of diagrams were developed.

Quillian's semantic network was called the Teachable Language Comprehender and although such networks were developed to try to model the way in which knowledge is organised and accessed in memory, they can be used to compare information presented via the written word. The drawback to this model is that it is not flexible enough to account for elements arising from previous experience.

The Human Associative Memory model introduced by Anderson & Bower (1973), used proposition trees to represent linguistic structures such as sentences. The H.A.M. representation accounts for world knowledge and recently acquired episodic knowledge but cannot recognise equivalent statements as being the same thing.

Norman & Rumelhart (1975) introduced the Lindsay–Norman–Rumelhart system by which to represent information. The L.N.R. system represents knowledge structures as imaginary networks of nodes and interconnections. These interconnections are thought of as active, structural, bi–directional networks by

means of which information stored in nodes can be reconstructed. The information recalled is constructed from this underlying propositional base stored in the network. This more encompassing model of semantic memory breaks down the meaning of words into underlying primitives in rather the same way as Chomsky (1957) postulated universals. His transformational grammar, with its surface performance reflecting underlying competence, aimed to show that a few universal grammatical rules formed the basis for creativity in language and he emphasised syntax as the link between word identification and meaning. The L.N.R. system evolved over time from a simple semantic network representation of the structure of information in memory to a more complicated system which accessed the underlying meaning of sentences to represent the message, no matter how it was phrased. Because it is more global, the L.N.R. system is more difficult to validate empirically but the theory behind all semantic networks is that the semantic recall of a passage reflects its semantic structures.

2.2.3.4 Story Grammars

Whereas Chomsky (1957) saw text as having a surface structure and a deep structure, Omanson (1982) divided texts into central and non–central units, and found the two categories to be complementary ways of describing the structure of a story. Following on the work of Mandler & Johnson (1977) and Stein & Glenn (1979), Omanson used a story grammar to describe the structure of a given text i.e. settings, initiating events, consequences, attempts, internal responses and reactions. Story grammar categories describe the roles played by story constituents in

presentation of information in the text.

The way in which a pupil represents text in memory is of major interest to those conducting research in reading, because that representation is the product of the reader/text interaction and will be called upon when the reader requires to recall the textual content. The theory that the memory representation reflects the textual structure is of primary importance no matter how the complexity of that structure is described.

For the purposes of this research, which is chiefly concerned with the extraction of the gist of texts, the macrostructures and microstructures postulated by Van Dijk (1977) are important because of the different types of information they represent. Propositional analysis as introduced by Kintsch *et al.* (1975) is a useful means of matching texts as to the total amount of information they carry, and the syntactic and semantic aspects of text are also of prime importance as they concern the relationships of words, phrases and sentences in a text.

2.2.4 *LEVEL OF DIFFICULTY*

There are various ways in which the level of difficulty of texts can be assessed. They can be tackled in a global top-down process reflecting the strategy of the mature reader, or in the bottom-up manner of the early reader who builds on words and phrases. Two common methods of assessing textual difficulty are cloze procedure and readability formulae.

2.2.4.1 Cloze Procedure

A predecessor of cloze procedure has long been used in schools for sentence completion tasks. The sentences used in those tasks were generally unrelated. Now cloze procedure is used with reference to connected text. The process involves the regular omission of words throughout a passage, the gaps being expressed as regularly sized blanks. The reader, drawing on context clues, previous world knowledge and experience in reading, supplies the missing word. The method is sometimes said to be based on the psychological concept of closure, wherein the subject automatically supplies information missing from diagrams etc, to 'see' total structures. Cloze procedure is generally used to test comprehension but can be employed to compare the level of difficulty of passages of print. The performance of children, in completion of the texts to an acceptable criterion, gives an empirical measure of textual difficulty in relation to reader age. Cloze procedure was proposed as a means of assessing readability by Taylor (1953).

2.2.4.2 Readability Formulae

A commonly used method of matching text to reader is by means of readability formulae. Although some readability formulae are rather mathematically complicated for quick classroom use and more suited for research purposes, others e.g. Fog Index (Gunning, 1952) and Fry Readability Graph (Fry, 1977) can be quickly applied by the teacher to texts in class use to find the approximate age group for which they would be generally appropriate. Thorough review of many

of them is provided by John Gilliland (1972). The Bullock Report (1975) states that "a particularly important teaching skill is that of assessing the level of difficulty of books by applying measures of readability" (p. 113). Readability formulae, however, are not meant to displace the teacher's judgement, but to give an objective estimate of the difficulty level. The latter is usually given in terms of reading age which is the age at which a child of average reading ability, might be expected to successfully handle the text.

Although a useful construct, the term 'reading age' must be used with the knowledge that "the average seven year old reader is a statistical abstraction", (Bullock, 1975; ch. 2, note 3) because reading ability depends so heavily on personal factors such as interest and motivation as well as those which are inherent in the text.

Successful reading is the result of the interaction of text and reader (Clymer, 1968). When motivation is high, readers may usefully tackle material considered to be quite a bit in advance of their reading age, yet they may experience unexpected difficulty with that which has been carefully matched by means of an established formula. The reason is partly because measures of readability are based on only a few of the variables which are inherent in the printed text. For ease of application, formulae tend to be applied to these surface structures which can be objectively counted e.g. word and sentence length. Different formulae may give different results for the same passage, and users must be aware of which factors are being measured by each. Mismatch between text and reader when

readability formulae would indicate compatibility, may be due to variables not measured by the formulae or to inaccuracy or measurement of those they purport to assess. It may also be caused by a combination of interaction of the two. Simpson (1989) noted that although instruction material in a study of differentiation was well matched to the ability of average and below average pupils, the pupils of above average ability were not being sufficiently challenged. Readability formulae describe the level of difficulty of the text but they do not allow for the part played by the reader in successful interaction of the two. The interest level which a text holds for an individual reader is influential in promoting success in handling it.

Both cloze procedure and readability formulae are used in schools in an attempt to select appropriate reading material for individual pupils. Therefore research findings as to the advantages and disadvantages of each method of assessing textual difficulty are very relevant to research based on pupils' reading behaviour in the classroom. They will be employed occasionally to give what may be taken as an estimate of textual difficulty in this research, with more weight given to their greater reliability in the rank ordering of texts than to their more doubtful accuracy in predicting readability level of texts (Stokes, 1978).

2.2.5 *METHODS OF PRESENTATION AND RECALL*

The usual way of collecting information about the processing and comprehension of text in primary school is by the study of recall. In experimental situations the methods of presentation and recall are selected by the researcher, and variations in these can affect results. Subjects are presented with text in either reading or listening situations, while recall may be free and open ended, involve multiple choice formats, or employ summarisation techniques. Moreover, recall may be spoken, written, diagrammatic or pictorial and either immediate or delayed. Meyer (1975) found that recall on successive occasions showed memory of different items and therefore pointed out the importance of timing as a variable.

Neville (1988) found minimal difference in the response to different types of text, whether it had been heard or read, across the Primary Four (8–9 years), Primary Seven (10–11 years) and Second Year Secondary (13–14 years) classes or whether cloze texts or recall protocols had been used as assessment. Mulholland, in Neville (1985), concluded that pupils processed language in the same manner, whether it was presented as written text or taped material for listening.

Another important variable is the retention or removal of the text. If it is retained it provides opportunity for reference but if it is removed, rehearsal and memory become factors to be considered. Danserau *et al.* (1979) felt that re–reading or multiple passes of a text result in a type of web–learning in which an initial framework is filled in by subsequent readings. Tillema (1982), in research with

first year secondary pupils, contrasted pupil performance in comprehension of textual material presented according to web–learning theory with that following a linear sequence. The latter type of lesson would present material, one item at a time, and integration of each item would facilitate assimilation of the next. The alternative methods used in Tillema's research presented material in a more global form with an initial outline to be filled in with additional facts rather in the form of a jigsaw puzzle. This interconnecting presentation system is somewhat similar in concept to semantic networks. In the experimental situation, pupils in the 'web–learning' group as tested by multiple choice questions, scored systematically higher than those in the linear condition in all dependent variables.

Graesser *et al.* (1980) found that advance organisers and familiarity did not significantly facilitate retention of prose, whereas Ausubel (1965) found advance organisers, e.g. questions given before presentation of text, to be an aid to recall, in that they formed a guiding structure for the arrangement of input material. A possible explanation of Graesser's findings is suggested to be the interference of one set of material with another. This could be because of proactive interference when previously learned material interferes with a task but is more likely to be extra–experimental interference from material acquired over time (Baddeley, 1976). Most interference experiments are conducted in artificial conditions which do not resemble classroom practice, so findings may not be generalisable.

It would seem that the findings derived from web-learning experiments are particularly relevant to the present research in comprehension as the holistic nature of the tasks more closely parallels the process of giving pupils complete sections of text to read and understand. As such global comprehension ability is a teaching aim, portions of text for summarisation will be used in this research. The method of presentation of material and the form in which responses are requested also has important implications for research into comprehension in the classroom. It is necessary to be clear about the actual task demands being made of pupils when determining the form of the practical work and when assessing the accuracy of their answers.

2.2.6 *SUMMARY*

Research into many possible permutations of textual type, structure, level of difficulty and interest, and manner of presentation and recall, has shown that combinations of these factors influence to greater or lesser extent the outcome produced by subjects in experiments involving comprehension of text. Although experimental situations are not equivalent to normal class work in school, it seems reasonable to suggest that those factors also influence pupils' understanding of passages of discourse.

In this review of research on text, certain points arise which will be taken into account in setting up feasibility studies from which to develop a method of studying specific errors made by children in their interaction with the printed word

and grouping these in a suitable manner for further investigation as to their possible sources. These points are its holistic aspect, structure and type. Propositional analysis, cloze procedure and readability formulae will be used as measures of textual difficulty. Methods of presentation and summarisation for the extraction of textual gist, will also be studied.

2.3 INDIVIDUAL PROCESSING ABILITIES

Although factors in printed text may considerably influence the reader's comprehension of it, perhaps greater influence comes from factors brought by the reader to the encounter. These cover a wide range.

2.3.1 *DECODING AND ENCODING ABILITY*

The early stages of the teaching of reading are mainly concerned with decoding at the word and sentence level, the emphasis being given to either depending on the policy of the school towards the use of 'look and say' or 'phonic' methods. Teachers complain that once skill has developed to the stage when pupils can 'read', or decode, fairly fluently, they frequently fail to extract the intended content from the text, even if it has been carefully matched to apparent reading ability. That skill in decoding and comprehension of words, i.e. knowledge of sight vocabulary, may not be the most important skill in comprehension, was suggested by Freebody & Anderson (1983) but vocabulary tests are often used as a way of assessing pupil comprehension. Decoding ability is relevant to the present research

only as it affects the reader's ability to read sufficiently fluently and speedily to grasp the textual meaning without frequently becoming waylaid in the careful application of specific phonic rules. Average readers of PIV stage, 8–9 year olds in the Scottish system, would not often be held up by the difficulty of actually decoding the words in classroom reading although they might have little, if any, knowledge of what some meant.

It is important to consider the methods by which reading comprehension of pupils is generally assessed in classrooms. Apart from standardised tests such as the Edinburgh Reading Tests (Moray House College of Education, 1981) which may occasionally be used for class screening or individual pupil assessment, the common methods used are comprehension questions about passages of text, and probe questions, multiple choice questions, or cloze texts. Free recall, either oral or written, may also be used.

Lunzer & Gardner (1979) cite examples of pupils answering questions on texts without understanding the passage which they are asked to read. They can do this by scanning the passage for answers and manipulating the question structure into answer form. This form of answering does not always necessitate understanding although correct answers are usually accepted without query to indicate comprehension of text. Multiple choice answers have the same disadvantage plus an extent of lucky chance.

In cloze texts the readers have to use surrounding context to predict which words are missing from gaps in the text and insert them to complete the passage. Used in a diagnostic manner according to the classification of cloze responses of Mulholland (1984), cloze responses can be a valuable basis on which to plan subsequent remedial teaching but very often they are taken to show only the pupil's current ability to comprehend material of a specific difficulty level, and not used as a basis for future teaching.

Open–ended questions and free recall responses tend to be less generally used because of the difficulty of assessment, but when used they have greater potential for uncovering miscomprehensions than the other aforementioned methods of assessing understanding. A disadvantage is that pupils may avoid drawing on sections of text which they consider to be difficult, although Lunzer & Gardner (1979) suggest that pupils may report text to be easy when they are unaware that they have misunderstood it.

2.3.1.1 Construction and Reconstruction

Five decades after Bartlett (1932) noted the constructive nature of comprehension – that it was a process following general principles but specific to each unique individual reader – Siegel (1983) took a broad transactional view of the process. The transactional model involves not only the reader's knowledge and the text, but the social setting, and thus views the process of comprehension as an individual one – an experience specific to the reader alone, and one to be added to the

knowledge store. A transactional model allows for variations in interpretations of the same text and does not consider interpretations which fail to reflect the text to be 'errors' but rather to be the reflection of the reader's individual understanding of the discourse.

Discussing the 'classic research' of Bartlett (1932), Sanford & Garrod (1981) point out that the final stored representation of a text will be a product of comprehension. Bartlett read text to his subjects and found distortions in recall protocols. Subjects tended to remember the outline and invent details to fit the recall. In so doing they clung to stereotyped situations. Bartlett (1932) thought that recall did not reproduce the idea of the text but was a reconstruction of the passage using textual material modified in relation to the person's schema at the time of recall. Much textual information was assimilated into existing schemata and only salient details of the passage existed for recall in their original form. Sanford & Garrod (1981) suggest that if recall is the result of the comprehension process, this should have a predictable effect on the distortions appearing in the recall.

Clements (1979) and Frederiksen (1975) believe that no construction of material occurs during recall but only during acquisition while Spiro (1977) does not accept that recall is a mainly constructive process or a mere passive retrieval. He believes that constructions and accurate recall are generated by the same process. In his State of Schema theory of cognitive functioning Spiro (1977) tries to account for both thinking and remembering. He suggests that 'errors' or reconstructions can

be the result of active elaboration as the reader tries to assimilate incoming information with existing schemata. At the other end of the continuum, accurate recall could indicate a lack of such schema modification, and mere surface processing.

The State of Schema approach is a framework devised by Spiro to show that what is recalled from a text may be accurate or may have undergone some reconstruction and that the two types of recall are compatible as they result from the same comprehension processes. Information considered by the subject to be inconsequential is likely to be accurately recalled as it has not been used to update existing knowledge. Information considered important is more likely to be modified as a result. The State of Schema represents a subset of stored schemata relevant to the text in hand. It may consist of details from expectations about and previous knowledge pertinent to the textual content. An important point for teachers is that according to this theory, correct recall is not necessarily an indicator of correct understanding.

According to reconstructive theory, interaction between incoming information and pre-existing knowledge is along a continuum from altering the known to accommodate the new, to discarding the new in favour of the pre-existing knowledge. Interaction of incoming information with that already established may be to update that knowledge, to consolidate it, or to infer past events from previous knowledge. That the addition of new material in recall was an attempt to fill gaps that the reader discovered when recalling the surface structure, was suggested by

Mandler (1984) but Garner & Anderson (1982) found that responses do not always show where there are gaps in knowledge. Misunderstandings may be glossed over.

The relevance of constructive and reconstructive theory to this present research is the contribution of text–based and reader–based information to the understanding of text i.e. how much of the error content in a pupil's comprehension answers may be attributed to misinterpretation of the text and how much is due to inappropriate use of his or her existing knowledge. The other important point is the confidence of teachers that correct answers to comprehension questions indicate understanding.

2.3.1.2 Ability to Understand

In the situation of reading for recreation there need be no deliberate attempt to memorise particular facts, but when reading for information or when instructions are given by a teacher to a class, knowledge of the required outcome will affect the reader's interaction with the text and efforts to extract textual meaning and hold it in memory.

Clark (1978) viewed comprehension as grasping the interpretation the speaker intended for an utterance in a particular context. He called his view the intentional view, and placed it between independence theories which view comprehension as deriving directly from the grammatical forms of the words and sentences, and the constructivist view, involving also, personal thoughts and world knowledge. In the reading situation, Clark's intentional view of comprehension would entail the

extraction of the author's intended message from each section of the printed message – a type of problem–solving exercise involving the text and the reader's personal knowledge.

Graesser (1981) suggests that when statements are comprehended in prose, the comprehender constructs a cognitive representation which includes a variety of inferences. The view of Fulcher (1989) is that failure to extract the deep meaning of the text prevents readers from constructing the necessary mental model which allows comprehension.

Pugh (1981) writes 'comprehension is better seen as an active information–processing activity rather than as a passive pursuit of absorbing information' (p. 75). Lunzer & Gardner (1979) feel that ability to consider and reflect on text is the more global skill necessary for comprehension of text, whereas Sanford & Garrod (1981), state that comprehension ultimately depends on what is in the mind of the reader.

Davis (1972) isolated a hierarchy of eight skills, topped by word knowledge, whereas Thorndike (1973) who re–analysed the Davis data believed verbal reasoning ability to be the factor most involved in comprehension. Andrich & Godfrey (1978) also reworked the Davis material but did not find the hierarchy of skills to be clearly confirmed.

Comprehension is defined by Frederiksen (1975) as a series of processes used by

the reader to abstract meaning from text. It is postulated to be a series of steps used by the reader to build a memory structure which reflects the semantic structure of the text.

Whether or not processes are used serially, a number of different processes seem to be used by readers when extracting meaning from text. As so much of the school curriculum assumes that pupils have developed the ability to read and absorb information conveyed in text, this aspect of understanding is of special importance for this school–based research. Such understanding is a global skill encompassing sub–skills and reconstruction of the author's intended meaning in the light of the reader's personal knowledge and experience.

2.3.1.3 Selection

Smiley *et al.* (1977) emphasised the importance of the ability to extract the facts and exclude non–essential material in any comprehension activity, while Schallert (1982) defined comprehension as a problem – solving activity involving the construction of hypotheses which fit in with both the reader's expectations and the input from the text. The reader then searches for confirmation of these hypotheses.

Johnson (1974) found the recall of American undergraduates to show selective omissions, demonstrating selective processing, arising either from reader strategy or from the pre–existing knowledge state. Abrahamson (1975) suggests that subjects select a few important elements and express them in available language,

without attention to additional or omitted concepts.

Stein & Glenn (1979) suppose that readers form expectations which direct their attention to appropriate sections of text. These expectations derived from past experience of textual patterns and story formats, and subject prediction and expectation may help to decide on selection and categorisation of incoming information.

Carpenter & Just (1977), put forward the concept of a 'discourse pointer' which is developed from stored knowledge and is used to indicate the setting or context of the passage. From then onwards it guides the integration of the incoming information with that already stored and so has a selective function in comprehension.

It would seem that teachers marking pupils' comprehension work expect their understanding of the text to have been of the intentional type described by Clark (1978). The intentional view of comprehension involves extracting the author's intended message and interpreting it in the light of personal knowledge. Pupils' answers which derived exactly from the text are deemed to be 'correct' by teachers. Divergences are considered 'errors' and generally dismissed without further exploration as to their origins.

Consideration of collected 'errors' in pupil comprehension in the primary classrooms suggest that they may arise from a constructive type of comprehension

as described by Bartlett (1932) or the more personal transactional type postulated by Spiro (1977), in his State of Schema approach which suggests that text-based answers which teachers would consider correct may in fact indicate a lack of schema modification or a shallower type of processing. Bartlett's constructive comprehension was suggested to be a gap-filling process at the point of recall whereas reconstructive processes are thought to be of a more negotiative nature whereby incoming information is considered in the light of existing knowledge and either assimilated or reconstructed according to the degree of discrepancy between the two.

When pupils produce answers which teachers judge to be acceptable, the processes by which those answers have been deduced, are difficult to isolate. Examination of 'errors' can give greater indication of possible processes used by the reader in the effort to understand text. The important area for this classroom research is to try to discover the type of comprehension activity used by pupils who generally achieve acceptable comprehension outcomes, and by those who frequently do not, and to find out if there are qualitative differences between the two.

2.3.2 *ABILITY TO FORM MENTAL IMAGES*

Researchers in mental imagery suggest that to a greater or lesser extent most readers form some type of visual image of the events or situations about which they read. The fact that images are constructed in the knowledge system is generally accepted but empirical proof of their form or role is difficult to obtain.

That some subjects encode sentences as mental pictures, when they are to compare them later with presented pictures, whereas they verbally encode them for comparison, with pictures which are presented simultaneously was noted by Tversky (1975), showing that the method of encoding can alter with differing task demands. Bell (1990) asserts that the processing of text as successions of words and unrelated sentences often is due not to lack of decoding skill but to an inability to form visual images while reading. Failure to form an image of a section of text leads to failure to extract main ideas, make inferences and reach conclusions.

Dooling & Christiassen (1977) believe that the level of encoding makes an important contribution towards retrieval of information from text. They also point out that evidence as to the manner of encoding is provided by 'errors' in recall. These errors hint at how a subject may have linked an item to knowledge already stored, and thus give an indication of the coding or representation methods employed.

Pylyshyn (1977) suggests that a representation derived from sensory stimuli e.g. from visual experience, is not stored in any type of photographic form, but is interpreted and rearranged in a similar propositional form to text. He believes that not the scene but description and interpretations of the scene, are stored in the knowledge structure.

In research of 1971, Paivio pointed out that 'knowledge of the world' acquired in early stages by infants, is not acquired through the medium of language, but

through perceptual processes. Images of their surroundings are stored in some form. Language develops later and presumably links into the image storage system, supporting the view that imagery is involved in comprehension of text. If that were so, verbal input combining with relevant past experience would lead to the construction of images. Paivio's two-process model emphasised the importance of world knowledge on language comprehension, memory and recall, but in earlier research, Paivio (1969) pointed out the highly personal nature of imagery. Images are based on knowledge, experience and inference, and cannot, in experimental situations, be controlled as can verbal input. Individual skills and preferences also have an effect on the likelihood of image formation. Sadoski *et al.* (1988) supported Paivio's (1971) dual-coding theory that there is a parallel, non-verbal dimension to discourse processing which can be analysed and which contributes to the overall comprehension, integration and appreciation of text. That dimension is suggested to be imagination - the part of reading which makes the story come alive for the reader.

Later research of Paivio (1977) used imagery in experimental situations and based inferences about the function of imagery on the performance of subjects in given tasks. His conclusions were that imagery is an important aid in a variety of learning situations. Imagery is postulated to be a constructive and changing process, modified by experience, and not a static picture. Paivio argues that general knowledge may be stored in image form. His findings are supported by research into artificial intelligence e.g. Anderson & Bower (1973) whose Human Associative Memory system supports one propositional system of representation

for linguistic and perceptual input. The drawback to this theory is the one-to-one correspondence postulated between imagery and language when human experience shows that it is possible to imagine other than what we read. When imagining the image is generated internally. Paivio supports a dual coding model in which imagery and language are processed in independent but connected knowledge representation systems. Information may be held in one system independently of the other. Neuropsychological research by Nebes (1974) has found that linguistic memory is generally controlled by the left hemisphere of the brain while spatial and non-verbal skills are controlled by the right hemisphere, suggesting independent processing systems.

Amongst the researchers who favour the dual-coding view expressed by Paivio (1977), some believe that the necessary interrelation of the image and verbal coding systems, is by means of an intermediate propositional system. Seymour (1974) reported evidence that the intermediate coding system was in some way pictorial in format, although not necessarily photographic. It might rather be a semantic description of spatial relationships.

Norman & Rumelhart (1975) support a common representational system taking the form of semantic networks which hold information about the world in statement form, but believe that their system is not irreconcilable with a system storing information in image form. Their argument is that information retrieved as images sometimes contains errors and Norman & Rumelhart believe that these reflect a constructive process that lends weight to their theory. A scene, wrongly perceived,

may be interpreted as being something completely different.

A cuboid model of the intellect, involving five operations, four contents and six products was put forward by Guilford (1959). Further interpretation of the model by factor analysis, found verbal and non–verbal abilities to be separately processed. He also argues that world knowledge may largely be stored in the form of images.

Bower (1972) distinguished mental imagery from imagination. He explained the former as representation of past events and the latter as a re–arrangement of memory images. He also drew attention to the fact that there are images of sound, touch and taste as well as visual ones.

A 'mind's eye view' is the explanation of Graesser (1981) for the spatial image formed by a comprehender, of the scene or framework into which the other images arising from the text are set. That such images are individual, is obvious to those who have seen the film of a book they have read. Not all differences arise from technical restraints. A number come from the producer's personal 'view' of the scene depicted. Where there has been conflict of interpretation between the reader's and producer's images it tends to be the new visual image presented on the screen which takes precedence over that previously constructed from the verbal input.

Kosslyn & Pomerantz (1977) feel that input of information from all sources, is represented in a propositional format, which can be recalled in image or verbal

form as required. Their objection to the construct of mental image is that it is subjective, and its existence based on personal report. Moreover, the existence of images is not universally reported (McLullich & Palmer, 1989).

That methods of image construction can also vary was concluded by Kosslyn & Steven (1977) from their computer simulation of the imaging process. They felt that images could be formed solely from perceptual information or be constructed from verbal input as in the imagination of a reported scene.

A significant correlation between reaction times in comprehension tasks and the imagery ratings of sentences found by Thorndyke (1975) suggested that the imagery potential of discourse had an effect on the speed and accuracy of recall. Paivio (1969) felt that while pictures, and presumably also scenes witnessed, gave rise to images and verbal coding, the former would be more easily recalled as the latter involved another dimension of encoding. Words of high imagery value would therefore be more quickly recalled than more abstract ones, although in reading text, both would be verbally coded.

Kosslyn (1975) used not computers but a computer metaphor to explain the relationship between the image that subjects report seeing, and the underlying memory representation. He feels that the connection between the two is similar to that between the display on a computer screen and the program which produces it. The 'program' is supposedly held in long term memory in coded form. In experiments with graduate subjects, he found only a limited amount of processing

capacity to be available for visual imagery.

From experiments with verification tasks, Jorgensen & Kintsch (1973) emphasise the accessibility of information stored as images. As decisions about high image value sentences were made more quickly than those for sentences of low image value when no imaging instructions were given they pointed out that the use of imagery appeared to be a natural strategy. The subjective reports of many subjects certainly points to a widespread existence of images and their value in personal comprehension and memory tasks. It seems possible from the available evidence that a visual image already held may take precedence over that constructed from the passage read.

Observation of young children in the classroom shows that most have a natural creativity suggesting the formation of mental images and use of imagination. It can be seen especially in their role play, use of construction material and art work, which suggest mental 'pictures' which they aim to achieve. As it seems to be such a natural process in children, imagining and imagination would seem to have particular relevance in the discussion of their comprehension of text. The highly personal nature of imagery mentioned by Paivio (1969) and the formation of 'a mind's eye view' put forward by Graesser (1981), have important bearing on constructive processes displayed in pupil answers in comprehension. The findings of both suggest that illustration could be an interesting alternative, to verbal pupil outcome in comprehension tasks.

2.3.3 *ABILITY TO HOLD IN MEMORY*

For readers to reproduce textual material in a recall protocol, they must in some manner store it in memory and much research has been devoted to the human memory system and its constraints as it affects text processing.

In early memory research, memory was thought to be dual in composition, comprising of a short term memory and a long term memory (Baddeley, 1976). It was thought that the short term memory functioned as a holding store until information was transferred to the long term memory. More recently, research has concluded that short term memory also has a processing function before input is transferred. This is referred to as working memory (Baddeley, 1976).

2.3.3.1 Memory Capacity

Miller (1956) calculated the short term memory capacity to be seven 'chunks' of information, but no limit has been established for long term memory. A 'chunk' of information is taken to be an individual meaningful concept. Bereiter & Scardamalia (1983) point out that a chunk is a subjective unit, delineated by the reader, and guess five chunks of information might be held in the working memory of adults while involved in an attention-demanding situation e.g. reading. The proportionate number suggested for children would be two chunks for seven year olds and three chunks for nine year olds.

Accepting that distortions in recall can be used to study the mental processes which possibly take place between the input and recall of information, Abrahamson (1975) studied the elements of semantic information i.e. the individual concepts within each proposition. Results showed that when undergraduate subjects added elements to propositions, these replaced original elements so that the average number recalled was 7.3. This is in line with Miller's research into the 'magic number seven'. Johnson & Heinz (1978) defined cognitive capacity as a 'limited pool of energy, resources of fuel by which some cognitive processes are mobilised and maintained'.

2.3.3.2 Organisation in Memory

Walker & Yekovich (1984) investigating readers' memory for script-based texts, found that subjects 'remembered' information not present in the text. The explanation given was that the memory store consists of incoming information and pre-experimental knowledge. For this to be the case, it must be assumed that what is committed to memory is organised at the reading stage with any necessary gap-filling and elaboration made before information is stored. At point of recall it would not be possible to separate input from previous knowledge. This Associative Memory model postulates clusters of associated concepts within a larger associative network. The number of connections that are available from one concept to other concepts and propositions, determine its importance in the memory structure. Britton *et al.* (1982) concluded that the syntactic structure of simpler passages imposed fewer demands on cognitive processing capacity and

allowed for more embellishment of the text. Oakhill & Garnham (1989) thought that phonological coding might play an important part in comprehension as it would be a more lasting method of storing the earlier part of sentences to link with the following information.

The depth of processing theory (Craik & Lockhart, 1972) claims that the more attention given to a segment during processing, the deeper the memory trace will be, and therefore the information will be the more likely recalled. Rumelhart & Norman (1975) theorise that memory is represented by a structural network composed of nodes and interconnecting bi-directional relations. The construct is that information is encoded in nodes, and accessed via the network of relations.

The Conceptual Dependency Theory of Schank (1975) explains the structure of text in memory to be in the form of episodes linked by causal chains. Groups of episodes are organised into supersets or scripts. Schank believes texts to be stored as a whole and with a representation of each sentence. The likelihood of retrieval depends on an item's conceptual grouping and the number of causal links formed.

Rumelhart & Ortony (1977) believe that what is stored in memory, is not the text, but an interpretation of it via the comprehension process, while Thorndyke's Conceptual Complexity Hypothesis (1975) argues that not only does the grammatical complexity of a text affect memory, but that complexity of the meaning of the words is a variable. In other words, the complexity of the concepts and causal links in a text influence memory.

That knowledge stored in memory is hierarchically arranged, and that the superordinate or main units of information have progressively more detailed or subordinate units located beneath them are theories put forward by Ausubel (1969) and Rumelhart (1977). According to these researchers, forgetting is a bottom-up process with the less important details first forgotten. Clustering, therefore, is the result of the anchoring effect provided by superordinate for the subordinate facts. Schallert (1982) synthesising research into schema theory, quotes the von Restorff effect (Karis *et al.*, 1984) as predicting that subjects are more likely to remember the unusual or unexpected material which does not fit in well. The 'odd man out' becomes established in the memory store.

Tree Structures is the name given to these hierarchically arranged structures. According to Ausubel (1965) - Meaningful Learning Theory - the knowledge stored in a person's memory is arranged in a hierarchical manner with the most general and clear ideas at the top and detailed material organised in descending order of importance. New information from texts is thought to be linked to some relevant information already stored, and these links help to hold it in memory.

Rumelhart *et al.* (1975) described stories by means of a hierarchical network of categories and relationships between these categories. He used separate systems to describe semantic and syntactic relationships. He saw the text arranged as a tree-type diagram with the most important information at the top. The ideas of tree structure in prose was also developed in the work of Meyer & McConkie (1973) and Kintsch & Keenan (1973) but findings concentrated on position of

items in the hierarchy and not on content, which might have other effects because of potential imagery or interest (Crothers, 1972).

2.3.3.3 Likelihood of Recall

The Hierarchical State Transition Theory of Black & Bower (1980) postulates a critical path through a hierarchical memory structure and predicts that likelihood of recall depends on proximity of items to this path. Two types of retrieval – conceptually driven and data driven – are mentioned by Graesser (1981). The former accesses textual items from the specific memory structure whereas the latter, used in recognition but not recall tests, is activated directly by the test item. He believed that guessing is not random but based on information retrieved from the memory trace and that differential recall was linked to the properties of individual statements and not necessarily to the hierarchical level of the proposition.

The Response Criterion Hypothesis of Britton *et al.* (1980) explains the finding that information high in the structure of a text is more likely to be recalled than that lower in the structure in free recall situations, by stating that subjects set a response criterion in accordance with the perceived importance of the information. Material above the level set, most likely that high in content structure, would be recalled, while that deemed less important, and probably low in content structure, would be omitted. Britton *et al.* state that in free recall, retrieval proceeds from the top node of a tree structure downwards through a network of linking nodes,

until a link is broken. Beyond the break information is inaccessible.

Van Dijk (1977) contends that the macro–structure of a passage is the basis for summarisation. Meyer & McConkie (1973) also support a textual structure of superordinate and subordinate ideas.

Obviously the ability to hold information, not necessarily facts but also concepts and themes, is of critical importance for pupils in school. Once the decoding of words has been sufficiently mastered, short term memory is important for comprehension of text in its ability to hold the chunks of information contained in sentences together until they can be processed for storage in long term memory. Oakhill & Garnham (1989) suggest that phonological (rather than visual) coding might be the more useful practice in comprehension.

Of the various theories of memory representation discussed, the Depth of Processing Theory of Craik & Lockhart (1972) linking the amount of attention given to text segments during processing to its likelihood of recall, is in line with Spiro's (1977) State of Schema observation that 'correct' answers might indicate a less thorough form of processing than that involved in the production of constructive errors. The credit given to pupils who produce 'correct' answers and the dismissal given by teachers to their constructive 'errors' may be a contributing factor to the successful answering techniques that some children master while really not fully understanding the text. In many cases, what they have learned to do is to manipulate the textual structure.

Thorndyke's (1975) Conceptual Complexity Hypothesis also has a direct bearing on classroom work as the complexity of both the syntax and the concepts contained in text must have an effect on a pupil's ability to understand it, while Schallert's (1982) observation that the more unusual items of information are most likely to be remembered, is worthy of investigation.

Another very relevant finding for this research is that of Graesser (1981), that guessing is not random but based on information already held in memory and that salience of a statement for the reader is more influential on its possible future retrieval than its place in a hierarchically structured memory representation. This could explain some of the apparently irrelevant answers sometimes offered to teachers.

2.3.4 *ABILITY TO RECALL*

Given that research suggests that the recall of a passage reflects its semantic structures, memory has an important function in text processing. Recall involves memory and selection as well as understanding.

Marshall & Glock (1979) point out that to use recall as an indication of language processing methods, it must be assumed that the semantic structure of recall is similar to the structure of memory and that the structure of memory reflects the structure of the text. The memory structure coming between text and recall can not in itself be measured but comparison of discourse with recall protocols can

suggest the form of a structure in memory.

The subject's explicit focus on exact items mentioned in text, and the accessibility of the scenario into which they can be assimilated, are identified as major determinants of recall in research by Graesser (1981). The scenario is constructed from the subject's knowledge of the world. He states that certain types of statements tend to be recalled more consistently than others, namely the beginnings, settings, attempts and outcomes of passages of discourse and explains this by the fact that to a certain extent, one may be inferred from another. He emphasises that recall is affected by processes involved in acquisition, retrieval, and also during abstractions and summarisation.

Many studies of recall carried out with word lists, have shown proactive and retroactive inhibition i.e. interference from previously learned material and forgetting because of material learned later. With studies of prose, mostly with undergraduates, evidence was conflicting but Meyer (1977) found evidence to suggest that recall is inhibited by reading passages which have similar content but are different in structure. When subsequent texts are similar in structure but contain different information, recall is facilitated.

2.3.4.1 Patterns of Recall

Stein & Glenn (1979) studying comprehension in primary school children by means of taped free recall, found consistent patterns of recall across stories, grade

levels and time conditions. The major settings of stories, consequences of actions, and the events initiating actions, were the most frequently recalled categories while in order of frequency others were attempts, reactions, minor settings and internal responses. These results suggest that certain categories of information play a more important part in recall than others, and suggest that these categories may help to generate recall.

Kintsch & Kozminsky (1977) found a bias in favour of recall of setting and first quarter of stories, while Bartlett (1932) found narrative material in general, to be better recalled than descriptive passages. Schank & Abelson (1977) predicted that in free recall situations, familiar material would be better retrieved as it would be generated from established schemata.

Thorndyke (1975) found that in recall tests the overall style of the text has a facilitating effect on results. As the textual structure was moved from narrative to descriptive the quantity of recall decreased. Results suggest that the format can activate a general story frame to be filled with incoming information. This framework can be a general organising system for retrieval and influence the type of inference drawn by the reader. Texts without global frames are more difficult to recall.

That recall includes paraphrased textual content plus conceptual and relational information, accessed because of textual input, is the finding of Frederiksen (1975). Such information may have been reduced, simplified and over-generalised. Anderson & Bower (1973) suggest that such recalled data may be produced to 'fill in gaps' in the mental representation of the text.

Chou *et al.* (1989) found that texts containing information that differed from the subject's experiences were specially prone to reader-based constructions and Graesser & Haberlandt (1986) disclosed that the words and ideas of narrative texts activated more knowledge-based inferences.

In research into reading strategies in third and fourth year secondary pupils in Scotland following the Munn & Dunning Reports (SED, 1977), Fyfe & Mitchell (1985) concluded that "the fact that pupils have given correct answers to a series of questions does not necessarily demonstrate that they have understood the text. It may be that the assessment items are such that it is possible for a pupil to arrive at the right answers without understanding the text" (p. 140-141). They further found that "some pupils look at neither the assessment tasks nor the texts themselves in a way that seems 'natural' or 'obvious' to a mature reader" (p. 161).

2.3.4.2 Strategies of Recall

Of the strategies pupils employ in constructing answers, Fyfe & Mitchell (1985) found those based on an internal representation of textual content to be most

successful. Text-based answers involved searching the text for relevant material and falling back on background knowledge to replace the text when necessary. Literal questions could be successfully answered by this method. They also found question-based answers in which pupils built their answers on information given in the questions with little reference to the text. By this method pupils could produce plausible answers without comprehension of text by correctly using from it words and phrases which they might not understand.

Black & Bower (1979) tested the hypothesis that input was 'pigeon-holed' in a mental filing system, and that, as a result, would be recalled in related chunks. With adult undergraduates, results showed that an 'episode' or specific incident, acted as an organisational basis for recall.

Numbers and proper names are generally well remembered, according to Meyer (1984) possibly because they are given more attention. Recall therefore appears to be a top-down process guided by a search plan in the mind of the writer or speaker. Certain categories of event are more likely to be recalled than others, irrespective of causal links. In researching this fact Omanson (1982) found that these categories were composed of complete imaginable episodes and states, closely related to central content, and that the degree of centrality affected the likelihood of recall.

Meyer & McConkie (1973) demonstrated that a structure revealing logical inter-relationships amongst ideas in a passage, is important to recall information from passages, and suggested a relationship between certain aspects of cognitive structures which subjects construct from the intake of information, and the logical structure of a passage. This finding is followed up by Ballstaedt & Mandl (1983) who state that through elaborative inferences the knowledge structure present in the text is connected and integrated with the existing knowledge structures. They further point out that the more inter-connections there are in the memory representation, the easier the knowledge is to retrieve. They suggest that the relationship between the elaborations and recall, rather than being linear or in the form of a web-network, might be in the form of a U-shape. They reason that too little elaboration or inference does not connect items sufficiently for easy recall, while too much detail makes reconstruction of a text more difficult because of the number of schemata activated.

Staging is the process of arranging the text base (the semantic structure of connected prose) in a hierarchical manner. It is seen by Grimes (1975) to be an important aspect of discourse. It interacts with content and cohesion, to produce an integrated whole. The effects of staging on recall have been studied by Meyer (1975), Frederiksen (1975) and Clements (1979). They believe that staging has an important effect on free recall from prose. Information prominent in the text, e.g. the topic, is more easily recalled than that given less importance. They agree that the effect of staging on the memory structure is more probably during input than during recall.

Ability to recall textual material in school comprehension assignments is relevant when the text is not available for consultation after initial access e.g. a listening task or memory exercise. During most class comprehension work, the text seems to be available to the pupils. The research of Anderson & Bower (1973) who found that related information is sometimes recalled to "fill in gaps", and that of Thorndyke (1975) that format of text can activate general story frames, are both relevant to this study of comprehension 'errors'. Similarly, the findings of Ballstaedt & Mandl (1983) concerning the function of elaborations in recall are interesting in connection with this present research.

2.3.4.3 Influence of Task Requirements

That the form of outcome expected in comprehension tasks has an effect on responses, is an important factor. Stein & Glenn (1979) found consistent patterns in free recall protocols whereas Fyfe & Mitchell (1985) pointed out the patterns of response appearing in more structured question and answer tasks. The techniques they found to be employed in answering questions indicate some of the ways in which pupils may mislead their teachers into believing that they understand text when they do not actually do so.

2.3.5 *ABILITY TO SUMMARISE*

The drawback to the use of recall as a measure of comprehension is that it is necessary to decide to what extent it should match the original and how much re-

organisation and summarisation is acceptable.

Whether recall is the same as summarisation has been argued. Gomulicki (1956), found recall protocols to be similar to summaries as they both contained the salient points. Rumelhart (1977) found a high correlation between summary and recall data, but recalls were found to be longer, to contain more details, and to produce longer statements than summaries. Sometimes recalls, unlike summaries, reproduced direct speech.

Recall, does not involve so much re-organisation as does summarisation. Meyer & McConkie (1973) found recall to form clusters round main themes and these clusters to follow the order in which they occurred in the text.

As material is rarely recalled verbatim because of the demands on memory Wimmer (1980) suggested that summarisation could be a strategy used to handle memory capacity problems. Kintsch & Van Dijk (1978) put forward the suggestion that the attempt to organise meaning elements into a coherent whole results in differential retention. The attempt to recall forces the reader to process information by reproducing textual material in alternate forms. It involves paraphrasing, inferring, linking with previous knowledge, analysing the main points and possibly imagining, and highlights any weakness in comprehension. Glenberg *et al.* (1987) saw summaries as forms of mental models constructed through the interaction of textual contents and readers' knowledge. Zabrucky & Moore (1989) and Oakhill & Garnham (1989) discovered that poorer readers had more difficulty

in integrating ideas than better comprehenders.

The essence of a summary is recall of the gist of the text. If readers fail to recall this, it may be because they are forced by the difficulty of the text to read in a word by word manner. This gives surface meaning only and misses the underlying deep meaning (Townsend & Bower, 1988).

The process of summarisation, involving as it does the grasping and paraphrasing of the main textual content, would seem to be of major relevance in research into classroom comprehension and likely to indicate those pupils who have developed successful strategies for disguising their lack of understanding.

2.4 ENVIRONMENTAL EFFECTS

The socio-economic background of a primary school reader can have considerable effect on his ability to handle language. The child who grows up in a book-filled home, has been read to since infancy and views books as a source of potential pleasure has a great advantage over the child of illiterate parents. On the purely practical level, a child in the latter group may not get reinforcement in the home as he struggles to master early reading books, although literate parents are no guarantee of parental assistance and interest.

Research into the relationship between social class and educational achievement has been carried out by Lawton (1968) and Bernstein (1971). Bernstein claimed

that working-class children had access only to a restricted linguistic code whereas middle-class children could use both restricted and elaborated code. Lawton considered that the limited linguistic ranges of many working-class children is an important factor in their under-achievement, and also believes that the disadvantage is cumulative in that it generates an ever-widening spiral of educational difficulties. He sees the contrast between home and school situations, not only as one of language, but also one of conflicting attitudes, values and expectations.

Hess & Shipman (1965) put forward a similar argument from study of culturally disadvantaged children. They contend that such children are not only deprived in language but that their cognitive development is restricted. The suggestion was put that because deprived children do not have the sensory stimulation needed to develop their discriminatory powers, nor the medium of fluent language to promote thought and problem solving, they come to school lacking the basic skills necessary to handle the school curriculum with success. This should be borne in mind when considering the comprehension errors of primary pupils.

2.5 PERSONAL CHARACTERISTICS

The Bullock Report (1975) notes that although a child's intellectual capacity has an effect on his or her ability to acquire linguistic skills, it must be remembered that intelligence is a developmental concept and that many children read above or below the standard an intelligence test result might suggest. In general, however,

children with verbal intelligence quotient above average would be likely to be better readers than those with below average IQ (Bullock, ch. 18, 18, 6).

However intelligence may be defined, differences in individuals are obvious and play a large part in a child's handling of text. Personal health can also help or hinder the reading process. The well-fed, well-slept, happy child has a tremendous advantage over the under-nourished, tired child who is emotionally disturbed and insecure. Personality factors such as concentration, motivation, attitude and behaviour are affected by the general state of physical and mental health. McClelland (1984) thought that when pupils are presented with difficult concepts or conflicting information they may feel that the effect of trying to come to terms with the ideas may not be worthwhile, and abandon the attempt. Salomon (1984) agreed that motivation as well as ability combined to affect learning outcomes. Physical handicap of hearing, vision, perception, speech or motor control are major non-textual factors affecting reading.

2.6 DEVELOPMENTAL EFFECTS

Another non-textual factor which could influence comprehension of text, is the developmental level of the subject. Research has found that word perception techniques, quantity of recall and inference, all change with increasing age of child subjects.

Rayner (1976) found that in visual perception, children up to about nine years were greatly influenced by the first letters of words, while older subjects paid more attention to overall shape of words. Curtis (1980) pointed out that the attention necessary for decoding in young children, left less for comprehension purposes, while Naus (1982) suggested that the greater world knowledge of older children, and not memory capacity, resulted in their improved recall.

Meltzer (1982) concluded that there is a developmental shift in 6–7 year old children. At the younger level, discrimination and analysis are more important in text–processing while in older children, memory and higher order synthesis play a greater part in recall. Wimmer (1980) felt that the improved recall of older children might be due to their increased ability to summarise.

That the number of inferences made increased with age as did the number of internal responses when classified according to Rumelhart's grammar (1975) was found by Stein & Glenn (1979). Christie & Schumacher (1975) investigating the relationship between age of school subject and the recall of relevant and irrelevant material found that, although the overall total recall increased from kindergarten through to fifth grade, the amount of relevant material recalled, was at all stages greater than the quantity of irrelevant material. Moreover, relevant material tended to be recalled in the order in which it had appeared in the text. This finding was contrary to that of Piaget (1926) who found that the egocentricity of children below 7–8 years influenced their recall in that items of personal importance would be first to be recalled, regardless of their position in the text. Donaldson (1978)

disagrees with Piaget's findings, pointing out that in the right conditions, even pre-school children can decentre, reason and form inferences. Observation of young children at play and consideration of their responses when listening to stories supported her experimental results.

The number of schemata on which a reader can draw with increasing age and experience is pointed out by Schallert (1982), who also noted that schemata become more elaborate and specific as world knowledge accumulates. Murray (1988) found children to give priority to fairly schematic memories but felt that older children possibly might give more effort to the process of encoding. Zabrucky & Ratner (1985) however found that, regardless of age or reading ability, children of third and sixth grade do not perform well on tasks involving the spotting of errors and inconsistencies. Zabrucky & Moore further suggest (1989) that the factors which cause pupils to realise that they are misunderstanding may be much more complex in sixth grade than in third grade. The 1988 Scottish Education Department Assessment of Achievement Report noted a pervading lack of achievement in comprehension of many pupils right into second year in secondary school. This disturbing finding is paralleled by that of Mulholland & Neville (1989) who found that in relation to increasing age and experience there was a lack of expected pupil progress over the 8–14 year age range.

Zabrucky & Moore (1989) found that the ability to detect nonsense words developed early and did not show improvement with increasing age. Dixon (1984), working with adults, found that subject knowledge and ability, and the

level of information in texts, confounded the results of research, which tried to gauge the effects of age on the identification and use of the structural organisation of the text.

Markman (1981) found that young children, although they tested the compatibility of individual items, did not consider the relationship of one to another throughout the text. Scardamalia & Bereiter (1984) noted that young readers appear to go through passages of text checking items of information against facts they know. They do not make inferences unless the items are incompatible with their world knowledge. Younger readers were found to process text sentence by sentence and not to modify information in the light of subsequent input, while teenagers were more likely to re-read and check facts for relationships and inconsistencies.

Bereiter & Scardamalia (1983) found that the technique of chunking facts to make them more easily held in memory in increased quantity, developed with age. They suggested that readers of about seven years might hold two chunks of information in working memory but nine year old readers might hold three. Subject choice and previous knowledge could influence the number of chunks held. Markman (1979) suggested that the apparent inability of 8-11 year olds to detect inconsistencies might not be due to a failure to infer, compare or retrieve information, but to their limited concentration which did not allow them to combine the necessary processes. Brown & Smiley (1977) found a strong developmental trend, working with subjects in third, fifth and seventh grades when investigating the ability of children to use, as adults do, the important idea units of a passage, as an aid to

recall. Even young children tended to recall major ideas without realising that they were doing so, and for all subjects, recall efficiency was improved by the use of ideas of structural importance as a basic framework.

Brown & Day (1983) drawing on their current and past research suggest that fifth–seventh graders use a 'copy–delete' strategy when summarising text, reproducing some sections verbatim while deleting others, with little attempt to express the main points in their own words. The ability to restate the gist of the text was not found until work of older high school pupils was studied, suggesting that summarising skills are generally later in developing.

Paris & Upton (1976) found the ability to understand inferences expressed in the text, improved with age, between six and ten years, and found a positive relationship between comprehension of inferences and memory for prose. They postulated that the improvement was not due to increasing age alone but to changing strategies for remembering text. Research by Paris *et al.* (1977) suggests that young children need to be prompted to go beyond the given information to make inferences, as they do not automatically do so.

2.7 INFLUENCE OF EXPERIENCE

To a certain extent, experience is linked to development in that the way in which a child interprets experience depends amongst other factors on the level of cognitive development he or she has reached. A child in the egocentric phase of

development will interpret his or her world in a different manner from one who has reached the pre-operational level, (Piaget, 1926). The experiences to which a child is exposed, on the other hand, depend on environmental factors such as geographical location and socio-economic class.

2.7.1 *PRIOR KNOWLEDGE*

Much research into the comprehension process refers to the role played by the reader's prior knowledge. The 'knowledge base' as explained by Sanford & Garrod (1981), is the information stored in the memory and brought to bear in understanding a piece of discourse. By reading, the printed words and sentences somehow affect the knowledge structures, be they semantic, situational, or informational, and produce a representation which is the meaning of the discourse. The problem for researchers is how the knowledge structures relate to the text to produce a representation of the meaning of the text.

Bartlett (1932), Rumelhart & Norman (1975), Schank & Abelson (1977) and Kintsch (1977) believe prior knowledge to be stored as schemata to which incoming information may be assimilated. Collins & Quillian (1972) found that the degree to which a reader understands a sentence depends on the amount of stored experience he can relate to it and pointed out that people differ widely in the type and quantity of information they call upon.

Fischer & Mandl (1984) expressed the major goal of learning to be the working out of information contained in texts, the reduction of it to its main points, comprehension of the gist and integration of that with the learner's existing prior knowledge. Graesser (1981) found that subject familiarity had little effect on reading time and suggested the reason to be that familiar material requires less processing effort and allows more time for construction of inferences based on prior knowledge. Chou *et al.* (1989) found that topic familiarity could lead to wrong constructions, even in college students.

In research of 1971, Paivio differentiated between verbal and non–verbal knowledge. Verbal knowledge comes from the spoken and written language, whereas non–verbal knowledge is in the form of images of objects and events but these may be evoked by verbal stimuli.

Walker & Yekovich (1984) found that pre–experimental knowledge of what is important or likely affects what is remembered from text. Readers 'remember' information not actually present in the print. The explanation assumes that memory of text, comes from composite memory formed from incoming information and that already present in the memory store. At time of recall it is difficult to differentiate between the sources of the knowledge.

Studying context effects, Bransford & Johnson (1973) concluded that prior knowledge of a situation was not always useful in the comprehension process. It can have interference effects or influence perception of what is important in a text.

Dooling & Lachman (1971) showed that knowledge of the theme of a passage improved retention and recall while Anderson & Bower (1973) found interference effects. Most interference studies involve learning of lists of words under closely controlled conditions. The interference effects of previous knowledge acquired over years, on comprehension and recall, is more difficult to demonstrate. Craik & Lockart (1972), in their Depth of Processing Theory, suggest that material not easily integrated might be filtered out. Alternatively, it might be given extra processing time, not deemed necessary for familiar material. Peeck *et al.* (1982) found that in educational settings, fifth graders tend to keep the textual material isolated from their prior knowledge, and treat school material as unrelated to everything out of school. That the lack of development in higher order reading skills over the last few primary school years is possibly caused by lack of necessary prior knowledge is the finding of Englert *et al.* (1984) and Golden & Guthrie (1986) noted that even children sharing the same background knowledge have a personal response because of their interests and feelings.

In an interesting experiment by Tuinman (1973) to determine the contribution of children's background knowledge to their understanding of text, it was discovered that a large proportion of the questions in five widely used standardised tests administered to 1,200 fourth, fifth and sixth grade American pupils, could be answered without any reference to the text at all. As much of the comprehension work carried on in school classrooms is based on the assumption that there is a direct relationship between the answers pupils give to questions and their understanding of text, the suggestion that the assumption may be faulty and that

questions may be answered on the basis of previously stored general knowledge alone is an important one for teachers.

Black & Wilensky (1979) felt that in view of all the conflicting findings about the effects of prior knowledge more useful research could be directed towards the type of knowledge which is needed to understand text, and how that knowledge is used in the process of understanding. Such research would be particularly relevant to children's work in the classroom.

2.7.2 *GENERAL KNOWLEDGE*

As well as specific knowledge of material content which a reader might bring to a text, all readers have built up, over years and through experience, a much more general knowledge of the world, and a knowledge of the production of language. For each reader, such acquired background knowledge is slightly different and may lead to the formulation of individualistic inferences which are used to fill in gaps felt to be present in the text. This constructivist view of comprehension was first put forward by Bartlett (1932) and can appear to be personal and irrelevant to another reader. Sanford & Garrod (1981) use the term 'episodic' memory, to refer to actual situations, and 'scenario' for the more general memory which has been used to interpret the situation. Whereas the former will fade, the latter is not likely to do so, being bound up in the knowledge and interests of the reader.

Van Dijk (1977) uses the term 'frames' to describe conventional knowledge which he described as containing, not only facts but possible facts, which are compatible with the actual world, and sees them as operating at macro-structure level. Frames are fairly general knowledge structures e.g. a frame for behaviour in a restaurant.

Trabasso & Nicholas (1980) see linguistic input as material by which people can extend or change their knowledge of the world, while Norman & Rumelhart (1975) feel that world knowledge which derives from all the information collected, and all life experiences, forms the framework upon which input is hung. To be represented in memory, incoming material must fit in with this knowledge, or be adapted to do so. Naus (1982) believes that to understand the connection between general knowledge and new information, it is necessary to find out which aspects of the known, affect the comprehension of the input, and suggests that inference plays an important part. Spiro (1977) predicted that in non-experimental situations, a person's interests and knowledge would have a greater influence on the memory representation than textual content and presumably in this case on verbal explanations.

Schallert (1982) feels that the reconstructive processes discovered by Bartlett (1932) occur both at the time of comprehension and recall, and also points out the underlying assumption of the reconstructive view, that a subject's performance on memory tasks will preserve real life information when it conflicts with textual information. The intentional view of Clark (1978) lies between the constructivist view of Bartlett, and the narrower view which supposes that a reader derives the

meaning of a text from the actual printed words.

How the reader uses his or her acquired knowledge to build a mental picture of what the writer is saying in the text, is pinpointed by Meyer (1984), as the main problem in producing a representation of the comprehension process.

The emphasis in teaching has changed over the past few decades from the imparting of facts to be learned by pupils, to the promotion of the development of skills and concepts by means of which pupils can access the information for themselves. How much knowledge individual children do absorb from books by their own efforts will depend on their ability to comprehend them, and conversely it appears that ability to comprehend text is to some extent affected by previous knowledge.

2.7.3 *SCHEMATA*

The term 'schema' has been frequently employed in research to describe the knowledge structure stored in long term memory, and waiting to be activated by information coming in. Graesser (1981) and Rumelhart & Ortony (1977), describe a schema as a structured summary of components, attributes and relationships which typically occur, and without which a reader would have difficulty in making sense of information in a text. Schemata may provide the knowledge necessary to understand a single word or a complete scene, and the fewer required to interpret a passage, the more easily it will be understood.

Graesser (1981), lists four functions of schemata. They provide background knowledge which aids interpretation of input and generate inferences. They also generate expectations and focus attention.

Bartlett (1932) suggested that incoming information which did not fit in with existing schemata is represented as a 'correction' and, having received extra attention, is more easily recalled. Bartlett's theory is called the 'Schema with Correction' hypothesis, and it was later developed in a Script, Pointer plus Tag hypothesis (Schank & Abelson 1977; Graesser *et al.*, 1980) which found that the 'pointer' would link typical information in both text and schema but atypical items would be separately tagged and more easily remembered. Rumelhart & Norman (1975) called a story grammar a 'schema' in the sense that it is a 'frame' or pattern. In representation of meaning, schemata in the mind of the reader are assumed to have interacted with the incoming information from the text. The product of the interaction is a new schema to be held in memory. Schemata therefore are liable to continual modification and change as appropriate constructs are recalled and re-interpreted in the light of the printed message.

Schemata are seen by Rumelhart & Ortony (1977) to be the key units in the comprehension process. Well-tested schemata can be used to predict and make inferences as past experience leads to expectation of outcome. They can be employed in a top-down process as concepts lead to predictions, or in a bottom-up process when they are invoked by the incoming data. Loman & Mayer (1983) feel that readers develop schemata for stories which guide their selection of

information and its organisation in memory.

Kintsch (1977) and Winograd (1977) see schemata, employed in the process of pattern matching, and conclude that incoming information is fitted into appropriate slots in a structural framework. Bransford & Johnson (1973) isolate global schemata as being more general, encompassing concepts used to organise material in a text, but suggest statement schemata to be used for difficult passages and unless statement schemata are linked by a global schema interpretation may lack coherence. Some global schemata follow recognisable patterns e.g. the structure of folk tales and are classed 'story schemata' by Rumelhart. Other terms used for schemata-based hypotheses are 'frames' (Minsky, 1975) and 'scripts' (Schank & Abelson, 1977).

All the knowledge, whether specific or general, acquired though experience or direct teaching, appears to form a basis against which incoming information may be tested for retention, re-organisation or deletion. Beers (1987) found empirical research to demonstrate that readers form schemata according to social and environmental constraints and suggested that readers who share social and environmental backgrounds could be expected to share a good deal of conceptual knowledge in the form of similar but not identical schemata.

Graesser (1981) noted that subjects tend to preserve textual input, consistent with the organising schema, and delete seemingly 'irrelevant' details, so items fitting established schemata should be more likely to be retained. In contrast, Bobrow &

Norman (1975) predict from their resource allocation hypothesis, that unusual items, being allocated more attention during processing, would be more likely to be remembered. The intrusion rate for typical items is higher than that for atypical items. The Script, Pointer plus Tag hypothesis of Schank & Abelson (1977) predicts that memory should be better for atypical actions and that subjects would not be able to distinguish between items mentioned in the text and those inferred, as both were part of the script.

The connection between the schemata children hold and their comprehension of text is an issue for this research.

2.8 READING EXPERIENCE, ATTITUDE AND TEACHER EXPECTATIONS

Another form of experience which affects a pupil's interaction with text is the past experience he or she has had of reading. This experience may have been confined to school or may have begun as listening to stories as an infant at home. The extent and variety of reading material to which the child has been exposed will have influenced his knowledge of the language of books, as opposed to spoken language. Clay (1972) suggests that the child with rich experience of books will have great understanding of bookish forms of language and more motivation to master the art of reading.

The quality of his past reading experience as pleasant, rewarding, frustrating or unhappy will have contributed to the attitude with which he or she approaches a reading task. If a child has come to view books as sources of pleasure and providers of useful information he will expect a reading assignment to be worthwhile. If on the other hand each reading task is viewed as uninteresting and another likely situation for failure, it is unlikely to be approached with any degree of enthusiasm.

The expectations of teachers can also affect pupil attainment. Much of the research concerning the effect of teacher's attitudes and beliefs on their pupils attainment was sparked off by the publication of *Pygmalion in the Classroom*, Rosenthal & Jacobson (1968). They predicted that a random selection of pupils, listed for teachers as likely to make substantial intellectual gain during the year, would do so to a degree greater than might be expected by chance alone. The study, they asserted, demonstrated that a teacher's evaluation of a child leads to a specific expectancy of performance which is in turn, communicated to the child who may then proceed to fulfil the teacher's prophecy. This is relevant because teachers who expect certain children to present correct answers may not probe further into their comprehension of the material studied.

The beliefs held by teachers would seem to affect pupil attainments in certain subject areas. Teachers who believed that boys do not learn to read so successfully as girls (Palardy, 1969) had their expectations fulfilled, while head teachers who expressed a positive or negative attitude towards low ability pupils learning French

found their predictions satisfied in language tests (Burstall, 1968). The implication is that teachers' beliefs may influence the curriculum they present, and limit their pupils' opportunities to use resources and widen their range of studies.

The finding of Her Majesty's Inspectors (1978), that children's learning difficulties may stem from the curriculum as well as from the child, is the major influence behind the change from remedial teaching to learning support during the past decade in Scotland, and is important in research into pupils' comprehension problems.

2.9 SUMMARY

Because reading involves interaction between reader and text, factors in the child as reader as well as those in the printed material, can affect the reading process. These range from ability to decode, encode, understand, remember, recall and summarise as well as to draw on previous experience and create mental images. Socio-economic background, physical characteristics, developmental and ability level, attitudes and expectations have also been found to be important factors in the reading process.

As well as these effects on comprehension, textual type and structure, measurement of textual difficulty and methods of presentation and recall are, as noted previously, topics of special attention in the thesis, have been referred to in the literature review of child-based characteristics of comprehension, and inform the

questions for the practical research. Other questions that arise from the review include the effects of types of comprehension outcome (e.g. written and illustrative), and of age and the influence of the area in which a child lives. Three clusters of factors affecting reading comprehension in primary pupils can be identified from the literature review and are addressed in the series of feasibility studies reported in the following chapter. The factors are those present in the texts used, those arising from the individual processing abilities of the pupils and those which are circumstantial i.e. age related, developmental, socio-economic or environmental in origin. The feasibility studies were carried out to gather information about classroom practices and to address issues of practicability prior to the main study. However, examination of the results of some of these feasibility studies leads to other questions for study which are relevant to the language curriculum of pupils aged 8-11 years, just as the literature review has suggested questions that are considered in the feasibility studies.

CHAPTER 3

Feasibility Studies

3.1 RATIONALE

A general introduction to the problem for research and an account of the theoretical background having been given, the methodological aspects have next to be considered. These were approached through a series of feasibility studies designed to answer questions developed from the review of the research literature and relevant to the problems pupils experience in their encounters with text. The feasibility studies formed a preliminary screening of methodologies in order to select those which were both useful and practicable given the constraints of time, space and pupil accessibility in classroom based research. From answers to the questions posed, hypotheses for the main study could be established and suitable means then be selected for testing them.

3.2 RESEARCH IN THE CLASSROOM

The concerns which gave rise to this thesis were the difficulties of comprehension experienced by some pupils in the 8–11 year age group who, having appeared to master basic reading skills, failed to extract the author's intended meaning from text. The aim of this research was to study pupils' interactions with text in order to discover reasons for their misunderstanding or failure to grasp the gist of text which they could read aloud without difficulty in the classroom. Even when a careful match between pupil ability and textual level has been made, pupils may well have comprehension difficulties.

Much of the research into reading processes and comprehension has involved specific items and laboratory type experiments divorced from the classroom situation. Teachers are involved with pupil interaction with text in the daily teaching and learning situation and it is important to discover what happens in that interaction. The best starting point for this research seemed to be with the readers and the tasks which cause them trouble. The most useful data appeared to be instances of comprehension for examination and categorisation.

When carrying out classroom research the experimenter is under a number of constraints. The curriculum is a heavy one demanding much of the teachers and pupils in covering the content as well as in exposition and learning and requests for access to subjects cannot be made too often. The methods chosen for the following feasibility studies were those which could best fit in with or supplement the ongoing classwork and yet provide useful information as to what may be happening in a pupil–text confrontation. They were influenced by time and practicability and also by the aim that the research tasks should as closely as possible match those set in the daily process of teaching and so reduce to a minimum any artificiality in the exercise.

Working on the assumptions generally held by teachers that departures from the author's intended meaning constitute 'errors' which display misunderstanding of the printed text and that recall is a reflection of the material committed to and held in the memory, it seemed that study of recall was compatible with classroom research. Suitable methods for production of pupil recall responses in class and

assessment of these could be selected. Ways of classifying and analysing the data could then be established.

3.3 ISSUES ARISING FROM THE LITERATURE REVIEW

Issues arising from the literature review which seemed particularly relevant to this study were textual type, structure and level of difficulty, methods of presentation and assessment and individual pupil characteristics of age, ability and previous knowledge.

Text and presentation method are two of the variables which it is in a teacher's power to vary in classroom comprehension work whereas the age, ability level and geographical location of pupils, other factors which can affect the class work, come with the class. Those factors also affected the feasibility studies which were undertaken mainly to assess what was practicable for children to do across the age range but also so that the findings might be used to develop questions and point directions for the research. Existing classes were used so that individuals would not be pinpointed as research subjects and so possibly feel a measure of stress but that constraint perhaps made the matching of subjects less accurate than if they had been drawn from a larger pool. The variables which could be manipulated were text and mode of presentation as in a normal teaching situation.

The other main decisions to be reached through the feasibility studies concerned the size of the subject sample and the standardised measures to be used for

matching groups of subjects as closely as possible to eliminate variables not under study. A method for matching texts had also to be selected.

3.4 PRELIMINARY QUESTIONS

The following preliminary questions were formulated.

1. *Are free recall results as a measure of pupil comprehension affected by listening or reading modes of textual presentation?* (Study 1)

Neville (1988) in research carried out from 1983 with 8 and 11 year old Scottish children, some from Tayside schools, found almost no difference in comprehension as measured by free recall of text whether the text had been heard or read. The research from which this thesis developed (MacMartin, 1983) involved 7 year old pupils withdrawn individually from class, in a listening situation. The feasibility study was carried out to compare comprehension as measured by free recall in listening and reading situations with each of the four age groups from 8–11 years.

2. *Do free recall protocols in written form differ from those in illustrative form in the amount of information they contain?* (Study 1)

Paivio (1969) mentioned the highly personal nature of imagery and Graesser (1981) put forward "a mind's eye view", as an explanation of a spatial image formed by the comprehender as a framework for other images arising from a text.

The research of Paivio & Graesser, together with personal observation of young children in the classroom, suggested that illustration could be a useful alternative to written recall of text in the study of comprehension in the top four classes of the primary school.

3. *Is it possible to describe texts in such a way as to enable them to be matched?* (Study 1)

A method of matching or comparing the textual excerpts used in feasibility studies had to be selected. Kintsch *et al.* (1975) introduced propositional analysis as a method of measuring the semantic compexity of prose while Kintsch & Vipond (1979) considered the number of propositions which can be held in working memory to be an important factor in text comprehension. It seemed therefore that in an investigation of comprehension, propositional analysis could be a useful measure of textual difficulty.

4. *Are free recall protocols in the form of annotated drawings a useful source of information as to the type of previous knowledge drawn upon by pupils in their comprehension of text?* (Study 2)

Siegel (1983) in research in a fourth grade classroom, noted that, in order to draw what they thought a text was about, pupils had to think about what they read and illustrate what that brought to mind thus drawing on their previous experience and theories. Following on design question 2 it seemed that a series of drawings with

comments might yield more information about comprehension processes than illustration of one section of a text.

5. *If the text is retained instead of withdrawn while subjects produce free recall protocols in the form of summaries and drawings, will the same amount and type of extraneous material be included in the responses?* (Study 3)

Retention of text allows for checking and re-reading whereas withdrawal involves memory and techniques such as rehearsal to aid recall. Anderson & Bower (1973) found that when text is withdrawn, related information is sometimes recalled from memory to 'fill in gaps' in recall. This finding could account for some of the extraneous material appearing in free recall protocols of the feasibility studies. Danserau *et al.* (1979) suggested that retention allowed for the formation of an initial framework to be filled in by details picked up in re-reading. This finding suggests that retention of text would give rise to less extraneous material in drawings.

6. *Are previously held beliefs about word meaning altered by interaction with text?* (Study 4)

Spiro (1977) predicted that in non-experimental situations a person's interests and knowledge would have a greater influence on the memory representation than textual content. Trabasso & Nicholas (1980) on the other hand, see linguistic input

as material by which people can extend or change their knowledge of the world. In view of the variety of interpretations arising in the feasibility studies and because of the general assumption that pupils are learning from the text they read in the classroom, this study was conducted to try to gauge the influence on text on previously held understanding about the meanings of words.

7. *To what extent does previous knowledge influence a pupil's comprehension of text?* (Study 4)

Collins & Quillian (1972) found that a reader's understanding of sentences depends on the amount of stored information he or she can bring to bear upon it while Walker & Yekovich (1984) found that recall is a composite memory formed from incoming information and that already held in memory. Bransford & Johnson (1973) reached the conclusion that prior knowledge can have interference effects or influence perception of what is important in a text. Schallert (1982) suggests that in memory tasks, subjects will preserve real life information when it conflicts with textual information. Teachers assume that the information pupils are accumulating as they progress through school is improving comprehension of text. A feasibility study was undertaken in order to assess the effect of previous teaching on comprehension of given material.

8. *To what extent is the comprehension of narrative text related to the reading age of pupils?* (Study 5)

The Bullock Report (1975) cautions that the term 'reading age' must be used with the knowledge that personal factors such as interest and motivation have an important bearing on a pupil's ability to handle text. Readability formulae which allow for calculation of reading age only deal with factors on the printed page but, as they are widely used in schools as a method of matching pupil to text, the relationship between reading age and comprehension is important in this research.

9. *Is cloze procedure a useful method of assessing textual difficulty for the purposes of this research?* (Study 6)

10. *Does cloze procedure offer a useful method of assessing pupil comprehension for the purposes of this research?* (Study 6)

Cloze procedure, developed by Taylor (1953) is much used in school both to test comprehension of text and to match pupil to material. It has the advantage of being more easily quantified than free recall responses. It is important to test it as a possible method of assessment of pupil comprehension in this research.

11. *Does cloze procedure offer a useful method of assessing textual difficulty and pupil comprehension for the purposes of this research when subject number is greater than the six subjects in Feasibility Study 6?* (Study 7)

12. *Does cloze procedure indicate the same types of reader misconceptions as revealed by free recall responses?* (Study 7)

Bartlett (1932) first noted that in recall of text from memory subjects imposed their own constructions on the text. Sanford & Garrod (1981) discussing Bartlett's research point out that, as the representation of text stored in memory is the product of comprehension processes, the distortions appearing in the recall may therefore give clues to the comprehension processes. Methods of assessment which allow for such miscomprehensions to be expressed seem useful for the purposes of this thesis.

13. *Does factual text written in a narrative style produce the same types of error as fictional text in free recall responses?* (Study 8)

Graesser *et al.* (1980) state that narrative types of prose are likely to be better held in memory than descriptive texts which are not necessarily arranged in causal and sequential order. Kintsch (1982) points out that informative text has generally longer and more complex sentences than narrative texts. As pupils progress through their school classes, ability to learn from factual text becomes an increasingly important requirement for their educational progress. In view of this and because factual text written in an informative style has been noted by Kintsch (1982) to tend to have longer and more complex sentences than narrative text, it is important to find out if pupils produce the same types of errors as when using narrative factual texts.

14. *Does readability level of text affect the type and quantity of errors produced in free recall responses?* (Study 8)

Readability formulae (Gilliland, 1972) assess the text and not the reader. At the lower end of the reading ability scale, because many rules and strategies have yet to be mastered, a small increase in the difficulty of text will need a considerable increase in the reading skill of pupils, whereas further up the scale of reading ability a considerable increase in textual difficulty will not need a parallel increase in reading skills. As subjects in this research cover a four year age range it is interesting to discover the relationship between textual difficulty and class stages.

15. *Do non-fiction passages produce the same numbers and types of errors as passages of fiction?* (Study 9)

Neville (1988) found Scottish pupils in PIV and PVII to perform better on narrative than on informative texts in both free recall and cloze test situations when the texts were apparently of the same readability level. She found this difference to persist into the second year of the secondary school, a finding which has serious implications when pupils are expected to extract much information from factual texts.

16. *To what extent are texts passage dependent?* (Validation of Texts 3.5.3)

When studying standardised tests Tuinman (1973) discovered that subjects could answer many questions without reference to the texts provided, but comprehension of pupils is frequently assessed according to their skill in answering questions about texts they have read. A feasibility study was conducted to discover the extent to which the four texts selected for the main research were passage dependent.

The feasibility studies were carried out to investigate issues raised in the literature review but as they progressed some results suggested other questions which could be usefully asked in a study of comprehension related to the 8–11 age group. The numbers and ages of subjects taking part in the feasibility studies were dictated by pupil availability combined with the need for minimum disruption of class timetables.

3.4.1 *FEASIBILITY STUDY 1*

Preliminary questions:

1. *Are free recall results as a measure of pupil comprehension affected by listening or reading modes of textual presentation?*

2. *Do free recall protocols in written form differ from those in illustrative form in the amount of information they contain?*

3. *Is it possible to describe texts in such a way as to enable them to be matched?*

3.4.1.1 Materials

Two well known works of children's fiction were chosen as textual sources. Passages from *Alice in Wonderland* (Carrol, 1865) and *The Wind in the Willows* (Grahame, 1908; Appendix 1, Nos. 1–2) were used to investigate differences in free recall after reading and listening to texts. The texts were analysed according to Rogers' propositional analysis system (Rogers, 1978) which was based on the work of Kintsch *et al.* (1975). The 'Fog Index' of Readability (Gunning, 1952) and Fry Readability Graph (Fry, 1968) were used to give a preliminary estimate of the reading levels of both texts.

The Fog Index gives a reading age which is suggested to be the age at which the average pupil could read and understand the text. It is based on sentence length and the number of words with three or more syllables. In using only word and sentence factors it may give an oversimplified estimate of textual difficulty because although longer sentences are generally more complex, some short sentences may be quite difficult to understand and certain long words such as 'television' are very familiar to children.

The Fry Readability Graph gives the grade level for which the material would be considered to be appropriate. The number of sentences and syllables in 3 x 100 word samples of text are counted, averaged and plotted on a graph to show the relative grade level. Like any readability formula it fails to take pupil characteristics of motivation and interest or typographical factors of layout into consideration. Both methods however are simple to apply and therefore likely to be of use to busy teachers in choosing appropriate texts for their pupils.

Rogers' method of propositional analysis was derived from that of Kintsch together with knowledge of computer networks, to produce a less complicated form of propositional analysis which could be more easily learned and applied. It analyses the structure of each sentence into triples, propositions and levels. A triple is only part of a complete description. In computer terminology it is the name given to a node–relation–node structure, hence the term 'triple'. Each triple carries an item of information and in a complex text there may be triples within triples. A proposition is a series of triples which share the same initial node and levels are

subordinate clauses. Those relating to the main clause form the second level while those relating to subordinate clauses form third or subsequent levels. The more complex the textual structure, the greater the number of levels in the analysis.

The sentence, 'At once they came up to look at me' could be analysed in the following manner.

e.g. Proposition 1 – subject – they
verb – came
time – at once
place – up
purpose – Proposition 2 – subject – they
verb – could look
extension – at me

Two propositions, eight triples and two levels.

The following table (3:1) compares the two texts used in this study when assessed by the Fog Index, Fry Readability Graph and Rogers' system of propositional analysis.

TABLE 3:1

Comparison of Propositional Analysis and Reading Levels of Texts

Text	Propositions	Levels	Triples	Words	Fog Reading Age	Fry Grade Level
a. *Alice in Wonderland*	18	2	83	119	12.2	8
b. *Wind in the Willows*	17	2	81	119	12.2	7

3.4.1.2 Measures Used to Match the Texts

Texts were assessed for complexity and difficulty by propositional analysis and Fog (Gunning, 1952) and Fry (1968) readability measures (Table 3:1). The above passages were chosen to investigate differences in free recall after reading and listening to texts. Both passages contained imaginative material but they differed in style of writing. Passage (a) was written in a narrative style whereas passage (b) was more descriptive or factual.

3.4.1.3 Subjects

The subjects were eight pupils (N = 8) in a composite PIV–PVII class (ages 8–11 years) in a small rural school. Two pupils of each age group used these texts, in matched pairs. The pupils were matched according to reading age as registered on

the graded word reading test (Schonell–Aston Index, 1982). Reading ages ranged from 9 years 11 months to 12 years 6 months.

3.4.1.4 Administration

The two groups, each of four pupils and including one from each of classes P1V–VII, used alternative texts for reading and listening. One group read the text from *Alice in Wonderland* and used the *Wind in the Willows* text for the listening assignment, while the second group used the texts the opposite way round. While one group tackled the reading situation prior to the listening one, the other group reversed the order.

In the reading situation, the text was read twice by the pupils at their own speed and then removed, while in the listening situation, pupils heard the text read twice by the researcher. The presentation of the listening texts was thus researcher timed. In both cases, pupils were required to produce written protocols summarising the texts along with illustrations of each passage. The latter were designed to provide extra information on pupils' understanding of the texts.

3.4.1.5 Results

Written protocols were scored by the number of triples recalled and the illustrations were assessed according to the same system.

TABLE 3:2

Verbal Recall from Reading and Listening
Number of Triples in Written Recalls

	Alice in Wonderland		*Wind in the Willows*		Total	
	Reading	Listening	Reading	Listening	Reading	Listening
PIV	22	26	18	13	40	39
PV	25	23	17	21	42	44
PVI	46	44	15	46	61	90
PVII	51	41	36	37	87	78
Total	144	134	86	117	230	251
Overall Total	278		203		481	

In the Scottish grade system primary IV includes the 8–9 year old age group, primary V the 9–10 age group, primary VI, the 10–11 age group and primary VII and 11–12 year old pupils.

Results (Table 3:2) showed verbal recall of *Alice in Wonderland* to be higher than that of *Wind in the Willows* in both reading and listening situations but the overall verbal recall of units of information (triples) to be higher in the listening situation than in the reading.

TABLE 3:3

Pictorial Recall from Reading and Listening
Number of Triples in Illustrations

	Alice in Wonderland		*Wind in the Willows*		Total	
	Reading	Listening	Reading	Listening	Reading	Listening
PIV	9	3	17	4	26	7
PV	14	6	14	24	28	30
PVI	7	3	11	20	18	23
PVII	9	10	22	16	31	26
Total	39	22	64	64	103	86
Overall Total	61		128		189	

Pictorial recall analysis showed the opposite results in Table 3:3 in that more triples were recalled for *Wind in the Willows*.

TABLE 3:4

Comparisons of Results for Reading and Listening Recall

	Reading Recall	Listening Recall	Total
Written	230	251	481
Pictorial	103	86	189
Total	333	337	670

Overall recall, Table 3:4, appeared greater in the listening than in the reading situations although the difference was $\chi^2 = 2.44$ – not significant $p<0.01$.

3.4.1.6 Discussion

It was considered that the following variables might have influenced the results in Table 3:4.

3.4.1.6.1 *Drawing and Writing*

Children tend to be less inhibited in drawing than in writing, in that when added to a written exercise many do not consider it to be 'work'. An illustration can indicate a reader's misunderstandings and comprehension level, more clearly than carefully constructed sentences which often merely link skilfully the given words and phrases and by operating on the surface structure reproduce the given text. Alternatively, some pupils are hesitant about drawing, feeling that their artistic ability is not high, and may produce the minimum acceptable. The method of recording, therefore is subject to individual preference, which can affect the results of a small sample.

3.4.1.6.2 *Reading and Listening*

In a small rural school where pupils aged 5–11 years share the same classroom, pupils must learn to listen carefully when it is their turn to have the teacher's full

attention. They also must, of necessity, learn to access much material for themselves, and spend a fair amount of time in free choice silent reading. The proportion of listening and reading employed in any classroom depends moreover on teacher style as some teachers talk and read to their pupils much more than others. These pupils were accustomed to using the listening centre with recorded story tapes borrowed from the local library.

A pupil's response to material presented in sound or print is likely to be affected by previous experience of these teaching methods and a small school sample is likely to be fairly homogeneous, as some pupils have the same teacher throughout their primary school years. The decoding element of reading is not present in the listening situation and this could help younger pupils to increase their scores.

3.4.1.6.3 *Reading Background*

The experience of children's literature which a child brings to a text, has been built up in both home and school. Some children are read to regularly from a very early age, and have a wealth of reading material available in the home and from libraries. Others have very little knowledge of children's books except for that provided in school, an amount which can vary greatly from place to place.

Only three of the eight pupils used in this feasibility study, had been accustomed to 'bedtime stories'.

Experience in reading and listening to children's literature is bound to affect the way pupils handle presented texts and possibly, therefore, to influence the results of a small group. Cook & White (1977) in a study of the re-inforcement potency of children's reading materials in a study of third graders pointed out that listening to heritage folklore at this age, provides cultural enrichment and a knowledge of structure even before the children can read the text for themselves.

3.4.1.6.4 *Knowledge of Purpose of the Task*

As pupils knew that the purpose of both reading and listening tasks was recall, the goal of remembering the story may have contributed to attempts at rote learning. Reading purpose affects the way in which any text is approached or processed and material read for information is read in a different way from that to be remembered. Because the protocol response was immediate, verbatim recall of sections of the text could have affected the contents.

Recall, if the purpose had not been known, would have been likely to show more paraphrasing, and reorganisation of the textual material, and might have produced different results. The Rothkopf effect (Rothkopf & Kaplan, 1972) demonstrates that the goal for which a common expository passage is read, influences how much of what is remembered. Gagne *et al.* (1977) conclude that the expectations aroused by instructions do influence the way material is read and remembered.

3.4.1.6.5 *Textual Factors*

Bartlett (1932) in the first major piece of psychological research into prose comprehension, found narrative material in general, to be better recalled than descriptive passages. The story–line, by linking together the different parts of the text, may lessen the pressure of remembering and provide more opportunity for processing the material. It may have proved easier therefore, to recall the text from *Alice in Wonderland* than that from *The Wind in the Willows* which was written in a more descriptive style (Table 3:3). The words used to describe a scene are drawn from a large number which might possibly have been employed. Category size – the number of possible answers – has been found to affect recall, mainly in sentence verification tasks, by proportionately increasing response reaction time, presumably because of the larger number of related items held in the memory lexicon. Collins & Quillian (1969) decided that some inter–connections between items in a semantic network make certain items more accessible than others. Intuition would suggest that items from a limited range or regularly used would be more easily accessed than those from a wider category of possibilities. Accessibility of items depends on how frequently they are brought to mind and together with quantity to be accessed – category size – affects recall. Textual factors can influence the recall of individual passages.

3.4.1.6.6 *Individual Characteristics*

Personal attributes of personality, alertness, sex, home background, and

nervousness might have affected individual protocols as might good or poor recall. However closely pupils are matched in terms of reading quotient, they are unique individuals whose personalities and personal interests are reflected in their interactions with texts, and whose concentration and performance can vary from day to day. Such variations can have considerable effect when the subject sample is small. Scrutiny of subjects' drawings prompted the idea that fragments of text chosen for illustration, might provide evidence of a child's perception of the structure of the text in terms of importance of propositions.

The trend in recall scores, both in reading and listening, in the expected direction, towards a regular increase in age, suggested a developmental effect.

These two final observations were considered worthy of further investigation. Illustration which had been included to indicate information not apparent in written recall and as an alternative recording method for those pupils less able to express themselves verbally was suggested as a means of gauging the reader's perception of textual importance. The indication of only a slight developmental trend across a four year age spread made it important to discover if that was more generally applicable or merely the result of a small sample.

3.4.1.7 Findings

Feasibility Study 1 shows that in the written recall there was a tendency for more information to be recalled in the listening situation whereas in the pictorial recall

more information was recalled in the reading situation but there was only a slight difference overall between listening and reading modes of textual presentation in a small sample of pupils. The pictorial recall protocols contained only 40% of the information contained in the written recalls. Chi-square analysis showed no significant difference between reading and listening situations across the four year age range. This was also the finding of Neville (1988) with subjects aged 8 and 11.

3.4.2 *FEASIBILITY STUDY 2*

Preliminary question:

4. *Are free recall protocols in the form of annotated drawings a useful source of information as to the type of previous knowledge drawn upon by pupils in their comprehension of text?*

As a result of examination of the pictorial protocols produced for Feasibility Study 1, subjects were asked to illustrate a text by means of a series of annotated pictures, rather than by one drawing. Although only correct triples were included in Feasibility Study 1 results (Table 3:3) the pictorial outcomes demonstrated subject's use of information not present in the texts. It was reasoned that a sequence of illustrations would yield more indications of the type of external information employed by pupils in their efforts to comprehend text. Such a task would show the parts of the passage significant to the readers, and also their ability to arrange drawings in sensible sequence. Subjects were asked to read the text as often as required until they felt they knew what it was about and then to retell the main points in a series of drawings which were accompanied by suitable captions.

3.4.2.1 Materials

The text chosen was 'The Lost City' from *The Jungle Book* (Kipling, 1894; Appendix 1, No. 3). The passage contained imaginative material presented in a

factual style, and was, in terms of propositional analysis, similar to the texts previously used.

Text	Propositions	Levels	Triples	Words	Fog Reading Age	Fry Grade Level
'The Lost City'	15	2	83	119	12.5y	7

3.4.2.2 Subjects

These were the same as used in Feasibility Study 1 – eight PIV–PVII pupils in a small rural school. N = 8.

3.4.2.3 Administration

The purpose of the task, to illustrate the text with a series of annotated drawings, was explained before the duplicated texts were distributed. The number of drawings was not stipulated but depended on individual subject choice. The texts were withdrawn from individual pupils as and when they indicated sufficient familiarity with the contents thereof. No method of attack was recommended and observation showed it to be varied, one pupil drawing all pictures before writing text, three completing writing before drawing, and four writing and drawing alternately. Written captions referring to each picture, and the drawings themselves, were scored according to the number of triples isolated in the

propositional analysis of the text.

3.4.2.4 Results

TABLE 3:5

'The Lost City' (Jungle Book) – Number of Triples Recalled in Annotated Drawings, When Text Was Withdrawn

Class		Pupil	Written Text	Illustration	Total	Class Total
a.	PIV	1	8	5	13	PIV
b.	PIV	2	10	8	18	31
c.	PVI	1	26	13	39	PV
d.	PV	2	26	13	39	78
e.	PVI	1	10	7	17	PVI
f.	PVI	2	18	13	31	48
g.	PVII	1	22	25	47	PVII
h.	PVII	2	16	13	29	76
Total			136	97	233	

Note: Time taken and topics of illustration were pupil choice.

3.4.2.5 Discussion

Written texts which accompanied drawings yielded more triples than the actual drawings and a slight developmental trend was suggested by subjects' individual scores in this small sample. Scrutiny of results suggested that extraneous items appearing in writing and drawing, yielded useful information about subjects'

processing and recall of text, not apparent in the scores. Certain types of error appeared in the presented results. These seemed to arise from attempts to reconcile perceived and known information and were not indicated by the score of recorded triples. The following four types of error were apparent, and were categorised accordingly.

3.4.2.5.1 *Reconstructions*

When pupils did not grasp the content or meaning or failed to hold them in memory while producing their annotated drawings, they seemed to recall fragments which fitted together in a way that made sense to them as it was compatible with their existing knowledge of the world. This category of error also tended to stem from visual misreading and demonstrated attempts to fit facts together rather in the manner described by Bartlett as "effort after meaning" – a type of rationalisation to explain the facts (Bartlett, 1932). Misreading of the word "thrust" as "thirst" presumably led to "the cobblestones in the courtyard where the king's elephants used to live, had been thrust up and apart by grasses ..." being recorded as "... the king's elephants died because of lack of water" (Fig. 1).

3.4.2.5.2 *Influence of Previous Knowledge*

Information extracted from text as a subject reads is added to or assimilated with that already held in the memory store (Rumelhart & Norman, 1975). This combined knowledge is used to interpret the next portion of text. Sometimes the

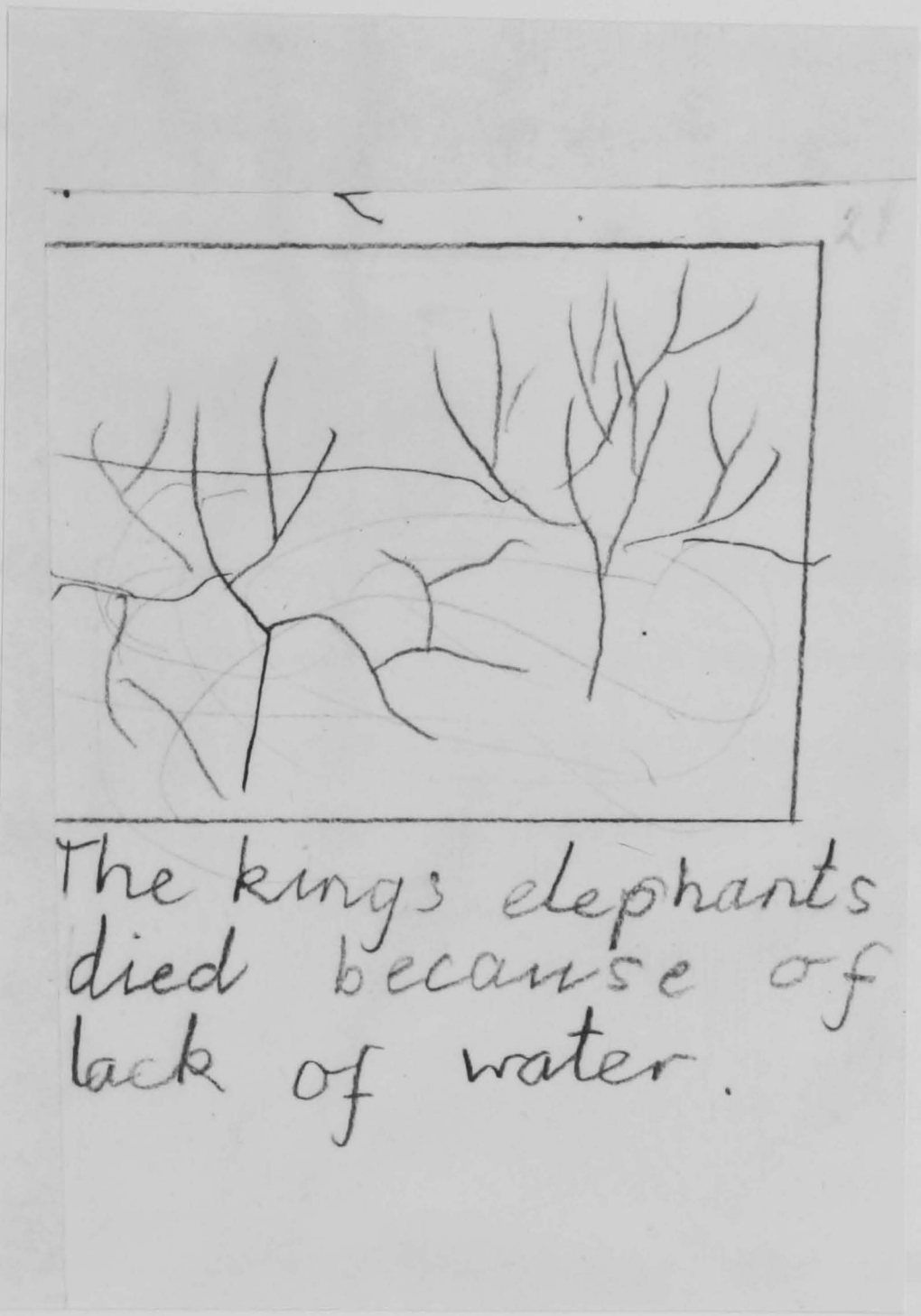

FIGURE 1

Reconstruction: 'The king's elephants died because of lack of water'.

wrong item of knowledge is applied to the comprehension of incoming information and an incorrect interpretation reached. Errors allocated to this category resulted from the use of known facts in the wrong situation. An example was the illustration showing tepees in the Indian city instead of buildings. Knowledge of the life-style of the Red Indians was produced in response to the significant word "Indian" in the text (Fig. 2).

3.4.2.5.3 *Misconceptions*

This type of error arose from confusion of homonyms when the meaning, which did not fit the context, was employed and illustrated. 'Creepers' instead of being shown as climbing plants on the walls, were drawn as little insects on the walls. This misunderstanding might not have been demonstrated in a written answer but indicated the "mind's eye view" suggested by Graesser (1981) (Fig. 3).

3.4.2.5.4 *Literal Interpretation*

Mistakes assigned to this category seemed to arise from 'surface' reading of the text, when the words were understood literally, sentence by sentence, and not linked to the total meaning of the passage. Previous experience and world knowledge would seem to be more drawn upon than context in these interpretations. Graesser's (1981) explanation of this type of behaviour was that passages are easier to understand with global schemas, but in very difficult passages, comprehension of statements is confined to statement schemas. An

FIGURE 2

Influence of Previous Knowledge: Tepees in Kipling's lost Indian city.

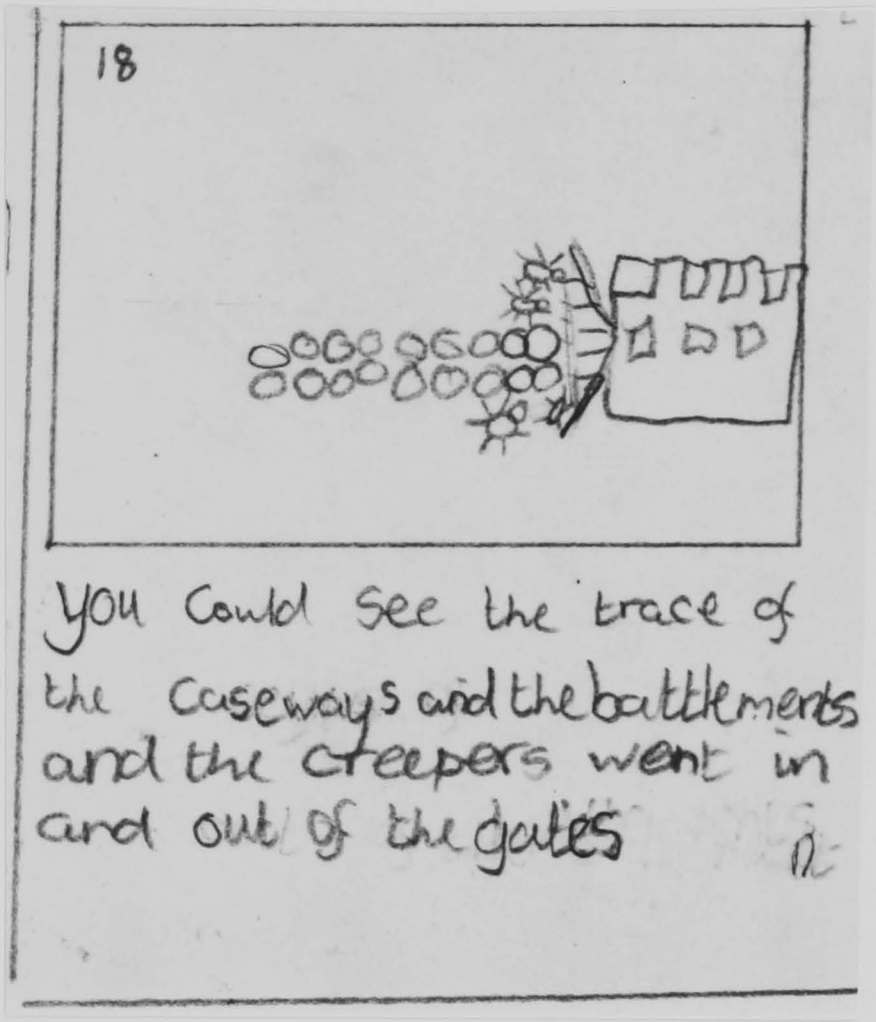

FIGURE 3

Misconception: "The creepers went in and out of the gates".

example found in the present study was the drawing of a king, complete with crown, brick laying, as comprehension of "some king had built it long ago". This showed a focus on the phrase instead of on its meaning in the complete passage (Fig. 4).

FIGURE 4

Literal Interpretation: "Long ago a king built the city".

3.4.3 *FEASIBILITY STUDY 3*

Preliminary question:

5. *If the text is retained instead of withdrawn while subjects produce free recall protocols in the form of summaries and drawings, will the same amount and type of extraneous material be included in the responses?*

Following up the idea that extraneous material included, and mistakes made in verbal and pictorial recall of text from memory, gave an interesting indication of pupils' methods of processing text, a Feasibility Study was conducted to find out if similar material and mistakes appeared when texts were retained during the drawing and writing exercises. The main purpose was to clarify the emerging category system. The task instructions given in Feasibility Study 2 were repeated, except that only one scene with notes was requested.

3.4.3.1 Materials

For this experiment, a passage, 'The Golden Dragon' from *The Hobbit* (Tolkien, 1937; Appendix 1, No. 4), was used. In terms of propositional analysis and length, the passage was similar to the others and contained imaginative material presented in a factual style.

Text	Propositions	Levels	Triples	Words	Fog Reading Age	Fry Grade Level
'The Golden Dragon'	19	4	87	119	13.1	8

3.4.3.2 Subjects

The subject pool was, allowing for absence and a school outing, substantially the same as that used in Feasibility Studies 1 and 2 (i.e pupils in a composite PIV–PVII class in a small rural school), together with pupils in a composite PVI–PVII class in a five teacher rural school, average age 10–11 years). In the Scottish system primary IV–primary VII are the 8–11 year old age groups. They form the top four classes in the primary schools. N = 22.

3.4.3.3 Administration

As the passage described only one scene, pupils were asked to draw and colour the scene portrayed by the text, and to write a summary of approximately 40 words explaining the main points of the passage. The duplicated texts were retained during the exercise.

3.4.3.4 Results

TABLE 3:6

The Golden Dragon – Number of Triples Recalled in Writing and Drawing with Text Retained

Class	No. of Subjects	Average Number of Triples Recorded	
		Summary	Illustration
PIV	2	27	7
PV	1	29	13
PVI	9	14.7	16
PVII	10	20.5	19.9
Total	22	91.5	55.9

3.4.3.5 Discussion

Allowing for unequal numbers of subjects in each group, a slight developmental effect was suggested in the number of triples recalled in the illustrations but not in the summaries.

It emerged that there was considerable confusion between 'summary' and 'story' as some pupils invented a story to fit the descriptive passage. The resulting worksheets showed further inclusions and misconceptions which would not have been evident without examination of verbal protocols and illustrations. The following errors were worthy of special note.

3.4.3.5.1 *Reconstructions*

A pupil who misunderstood the word 'lay' rationalised the perceived facts by including an 'egg' in his illustration. This production suggested a reconciliation of known and presented facts. It was known that dinosaurs produced eggs, and dragons were presumed to be a similar species. Anderson & Bower (1973) found that subjects filled in gaps with related information when text was withdrawn (Fig. 5).

3.4.3.5.2 *Literal Interpretation*

The text used in this pilot study described a slumbering dragon whose internal flames were barely obvious as he slept. One example of this type of error was the illustration of the phrase 'his fires burnt low' as a smouldering log on the ground giving evidence of literal comprehension of metaphorical writing. The word 'low' was taken to refer to position rather than quantity (Fig. 6).

3.4.3.5.3 *Predominance of Stereotypes*

This category is suggested by the number of green dragons which appeared although the passage clearly described a golden dragon. It is felt that the prevalence of a fixed idea of 'how things are' can overrule presented facts.

FIGURE 5

Reconstruction: Dragon laying an egg to reconcile known and presented facts.

FIGURE 6

Literal Comprehension: {"his fires burned low"}.

Scrutiny of the other feasibility studies showed that these errors appeared whether the text was retained or withdrawn, but totalling triples recalled in protocols in accordance with the propositional analysis of the texts, failed to demonstrate their presence. Such results indicated only number of items of information recalled, and not the inter-relationships of these items.

3.4.3.5.4 *Categories of Error*

The five categories of 'error' which have evolved from Feasibility Studies 2 and 3 are 'Reconstructions', 'Literal interpretation', 'Influence of previous knowledge', 'Predominance of stereotypes' and 'Misconceptions'. Similar extraneous material was introduced whether the text was withdrawn or retained.

3.4.4 *FEASIBILITY STUDY 4*

Preliminary questions:

6. *Are previously held beliefs about word meanings altered by interaction with text?*

7. *To what extent does previous knowledge influence a pupil's comprehension of text?*

In view of the scores derived from propositional analysis in terms of useful information about text processing, it was decided to repeat the experiment used in Feasibility Study 2 in a different school in order to assess the effect of prior knowledge and teaching on results, although this could be assessed only in a general way.

For that reason, before repeating the experiment carried out in Feasibility Study 2, an experiment to try to find out if previously established concepts of word meanings affected understanding of texts or were modified as a result of interaction with text, was carried out.

3.4.4.1 Materials

A series of groups of words which could be in some way linked or differentiated was constructed.

Each group consisted of three words, at least one of which was taken from the Kipling text previously used and describing the 'Lost City'.

George Kelly (1955) in *The Psychology of Personal Constructs*, developed the theory of constructive alternativism. In a manner similar to that employed by Kelly in his Role Construct Repertory Test which operationalised construct measurement (Open University, 1976), pupils were asked to indicate a similarity or difference between any two words in each group, and the third. Kelly's theory was that links made would indicate attitudes and lines of thought and it was hoped that this similar exercise would throw light on subjects' understanding of selected words before encountering the text.

3.4.4.2 Subjects

Subjects were 22 pupils in a composite PVI–PVII class in a five teacher rural school. Average age of pupils was 10–11 years.

3.4.4.3 Administration

Twenty sets of three words each were provided e.g. 'ancient, shattered, ruined'. Pupils were instructed to underline the two words in each group which were most alike but different from the third in some way. They were further asked to explain their choices. The exercise was not timed and carried out under normal classroom conditions.

3.4.4.4 Results

An average of 10 different reasons were given for linking two words together from each group of three. These ranged from the purely superficial to those displaying detailed previous knowledge e.g. "India, Africa, America" – "Both begin with A" and "India, Africa, America" – "Both have elephants".

Where a word had more than one meaning alternatives usually appeared amongst the class responses, e.g. "insect and creeper – both small animals" and "tree and creeper – both have roots".

Errors arose from misreading words e.g. "decayed, deserted, empty" – "Desert may decay your teeth", because of confusion between desert and dessert. An error amusing to Scottish readers was "king, summit, crown" explained by "a king wears them", because of the misreading of "summit" as "semmit" – the dialect word for vest.

Spires and mosaics mentioned in the word groups but not in the text were both introduced in pupils' drawings.

3.4.4.5 Discussion

Although there was some carry–through from the pupils' established understanding of words, as shown by this exercise, and comprehension of the text used to produce annotated picture stories on the following day (The Lost City) as used in Feasibility Study 2, it is doubtful if the extra feedback from the association task added much to the information gathered by examination of extraneous materials and comprehension errors, appearing in written accounts and illustrations. No new categories of error were noted but associations made between words suggested the way in which some misconceptions may arise.

The influence of prior teaching was equally difficult to ascertain. The work produced by the Feasibility Study 2 group showed, in the buildings, considerable influence of a recent study of Israel. Appraisal of the work of the second group (Feasibility Study 4) discovered no Israeli links but showed several examples of confusion between Indians and Red Indians although there had been no recent teaching on that subject. A classmate's drawings can quite easily be seen from other positions in the classroom, and the possibility of copying should not be disregarded.

The findings appear to be in line with Spiro's predictions (1977) that personal interests and knowledge would have a greater influence on memory representation than textual content. They also support the conclusions of Bransford & Johnson (1973) that prior knowledge can have interference effects.

3.4.5 *FEASIBILITY STUDY 5*

Preliminary question:

8. To what extent is the comprehension of narrative text related to the reading age of the pupil?

This study was undertaken to estimate the particular contributions of textual type and reading level of the child towards comprehension of a narrative text. The style of text was narrative and the material was fiction.

3.4.5.1 Materials

An imaginative text, 'The Jungle Train' from *Grandmother Oma*, (Kleberger, 1966; Appendix 1, No. 5) was used. It contained imaginative material written in a narrative style.

Text	Propositions	Levels	Triples	Words	Fog Reading Age	Fry Grade Level
'The Jungle Train'	20	2	89	119	7.6	4

3.4.5.2 Subjects

As in Feasibility Studies 1 and 2, eight pupils, two each from primaries IV–VII, aged 8–11 years, acted as subjects. N = 8.

3.4.5.3 Administration

On this occasion, to explore another method of measuring comprehension of text, as opposed to recall of given information, probe questions beginning "How ...?", "Why ...?", "Where ...?", etc, were given to elicit written answers rather than the readers producing their own. As with earlier passages, illustrations, in this case one scene, were requested and scored to assess accurate reproduction of stated facts.

The questions were posed to ascertain that attention had actually been given to the context of the passage. They were answered correctly but errors still occurred in the illustrations.

3.4.5.4 Results

TABLE 3:7

Average Number of Triples Recorded in Illustrations of 'The Jungle Train'

Class	No. of Subjects	Average No. of Triples
PIV	2	33
PV	2	23
PVI	2	20
PVII	2	27

3.4.5.5 Discussion

With use of imaginative material at lower level of reading difficulty, the developmental increase in recorded triples, previously noted, was not apparent.

One reason for this difference may be that the greater factual knowledge of the older subjects is not so useful in the interpretation of imaginative text. Scrutiny of the written answers demonstrated the prevalence of extraneous material and misconceptions similar to those already discovered in pupils' interaction with other texts. These results suggest that imaginative text, whether of high or low reading level in relation to the chronological age of the subjects, can yield, through 'errors' of comprehension and inclusion of extraneous material, clues to subjects' methods of processing text. Factual material written in a narrative style but at a slightly

higher level than this (Viking Feast – Feasibility Study 8) was not so productive of material of this style for research purposes, perhaps because subjects could draw more upon their historical knowledge as an aid to comprehension of the text. This suggests that comprehension, in that case, was more closely related to content than to textual difficulty and supports the warning of the Bullock Report (1975) that interest and motivation are important factors in a reader's comprehension of text.

3.4.5.5.1 *Classification of Errors*

To develop a method of classifying examples of pupils' miscomprehension of text, it was decided to construct, from the 'errors of comprehension' which had been displayed in the five foregoing texts, categories into which the errors might be grouped. 'Errors' were defined as departures from the given information as well as more explicable 'misunderstandings' of text. The following categories were decided upon.

3.4.5.5.2 *Justifications*

This category was described (Feasibility Study 2), as 'reconstructions' and demonstrated the reader's attempts to reconcile known and perceived information when the discrepancy was caused by misreading or misunderstanding of words e.g. "The king took his elephants and pulled the honeycombs to the temples" and "I was upset until a monkey handed me a banana". Having only understood part of the text and failed to make the proper connections between sentences, the reader

constructed a plausible explanation to account for the disjointed fragments. The explanation offered in Figure 7 makes a connection between 'elephants' and 'honeycombs' by using the knowledge that elephants are used to pull loads.

3.4.5.5.3 *Confusion of Word Meanings*

Previously referred to as 'misconceptions', these errors are of the type where 'creepers' were assumed to be creatures instead of plants – an interpretation which did not fit in with the rest of the text. Another example was 'lay' taken to mean 'producing an egg' rather than 'lying down'.

3.4.5.5.4 *Extraneous Items*

This category was, at this stage, simply a list of items included in the protocols, but not mentioned in the text e.g. sun, spider's web etc. The items were not necessarily wrong, but were collected to see if they shed light on processing methods.

3.4.5.5.5 *Transpositions*

It was found that words were frequently transferred from their original point of reference to other places in the text, so changing the meaning e.g. "The domes looked like honeycombs" instead of the "Houses looking like empty black

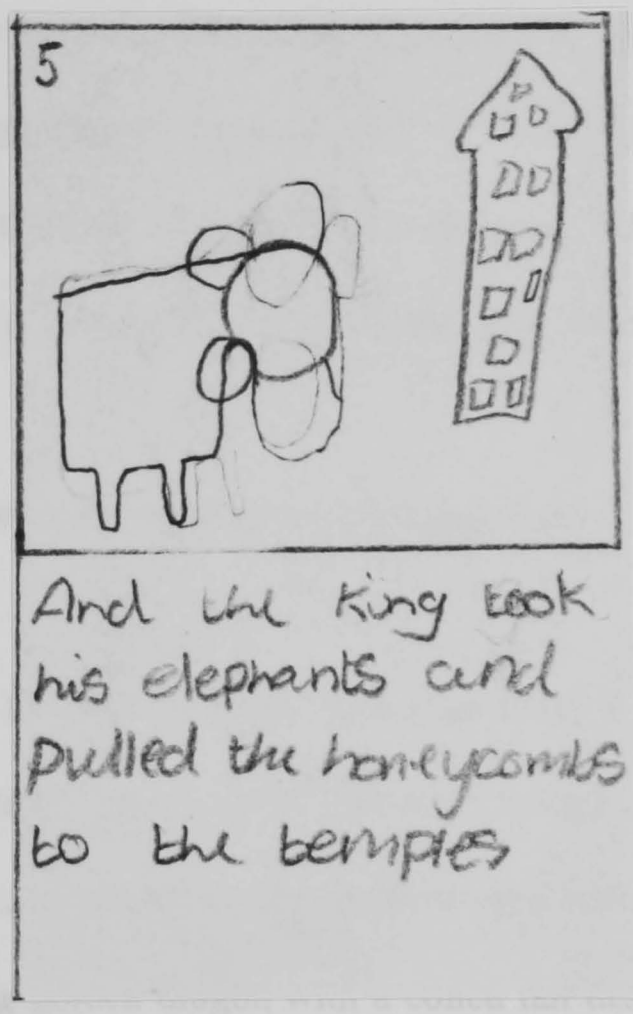

FIGURE 7

Justification: 'The king took his elephants and pulled the honeycombs to the temples'.

honeycombs" or "The elephants were in the battlements", rather than in the courtyard.

3.4.5.5.6 *Influence of Previous Knowledge*

Errors in this category showed the use of previously known facts which were in themselves correct but out of place in the given context. Frequently these errors were anachronisms e.g. Norman coats of mail on Viking warriors, but sometimes they arose from the addition of known facts as embellishments e.g. hexagonal tiling on house walls prompted by the reference "like honeycombs".

3.4.5.5.7 *Misinterpretation of Explicitly Stated Facts*

Errors appeared when the protocols presented information at variance with the facts clearly stated in the text. Examples of this error category were, a jar of honey instead of marmalade and a wide awake, green dragon with a straight tail (Fig. 8) instead of the sleeping golden dragon with a coiled tail described in the text.

3.4.5.5.8 *Literal Interpretation*

As previously suggested, this type of error arose from surface reading without attention to the deeper structure of the passage e.g. a drawing of a large bat while the description "like an immeasurable bat", was used to describe the dragon's wings, and a drawing of the king actually building the city as explanation

FIGURE 8

Misinterpretation of Explicitly Stated Facts: A wide-awake walking dragon (green) with a straight instead of coiled tail.

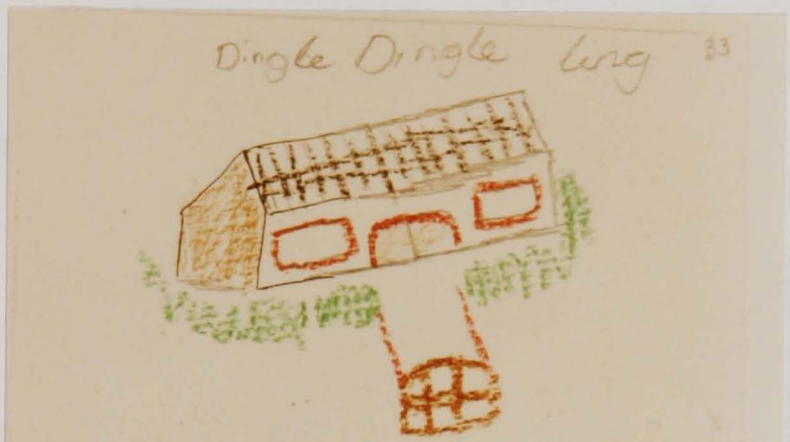

FIGURE 9

Literal Interpretation: "The longhouse rang."

FIGURE 10

Literal Interpretation: The dragon's 'bed'.

of "Some king built it". Other examples were 'Ting-a-ling' sounds issuing from the longhouse, prompted by "the longhouse rang with their laughter and song" while the dragon's 'bed' was a piece of modern furniture (Figs. 9-10).

3.4.5.5.9 *Predominance of Stereotypes*

As previously postulated, errors arose when fixed, established ideas seemed to take precedence over presented facts. This category differed from category 6, 'Misinterpretation of explicitly stated facts', in that it was less individual and more expressive of group experience e.g. dragons are green; animals, not people, are kept in cages; houses are represented as 'two-up, two-down, plus chimneys' (Fig. 11).

The errors in this category differ from those in category 5, 'Influence of previous knowledge', in that the latter are more random and individual than stereotypes, 'errors' which derive more from a generally accepted idea that 'things are so'.

The category system therefore at this stage consists of eight categories. Of these, 'Influence of previous knowledge', 'Literal interpretation', and 'Predominance of stereotypes' remain unaltered from Feasibility Studies 2 and 3. 'Justification' (formerly Reconstructions) and 'Confusion of word meanings' (formerly Misconceptions) are included under other names, and three new categories, 'Extraneous items', 'Transpositions' and 'Misinterpretations of explicitly stated facts' are included for the first time.

FIGURE 11

Predominance of Stereotypes: Animals, not people, are kept in cages.

3.4.6 *FEASIBILITY STUDY 6*

Preliminary questions:

9. *Is cloze procedure a useful method of assessing textual difficulty for the purposes of this research?*

10. *Does cloze procedure offer a useful method of assessing pupil comprehension for the purposes of this research?*

3.4.6.1 Materials

To assess textual difficulty from another perspective, the two original passages, *Alice in Wonderland* and the *Wind in the Willows*, were prepared as cloze texts with 15 deletions per text. The deletions were at almost regular intervals – every seventh word – but slight variations in the deletion pattern were made when the category of possible answers was large. In such instances, the deletion was made where the possible answers were more restricted by context clues, so that more evidence of the reader's understanding of them would be available.

3.4.6.2 Subjects

Two groups of pupils each consisting of primary IV, V and VI member in a different small rural school, acted as subjects for this study. N = 6.

3.4.6.3 Administration

Duplicated sheets containing the cloze texts with blanks for insertion of selected words were distributed. To control for practice effects, each group began with a different text. For the second testing session, on the following day, the order was reversed. Pupils were self-paced for the exercises and all acceptable responses were counted as correct.

3.4.6.4 Results

TABLE 3:8

Totals of Acceptable Responses in Cloze Texts

	a. *Alice in Wonderland*			b. *Wind in the Willows*		
	Attempt 1	Attempt 2	Total	Attempt 1	Attempt 2	Total
PIV	15	15	30	11	10	21
PV	15	12	27	10	8	18
PVI	15	13	28	12	8	20
Total	45	40	85	33	26	59

3.4.6.5 Discussion

Results suggested that passage (a) written in narrative style was more predictable than (b) the descriptive one. Scores for the cloze text used for the second attempt,

were, regardless of passage, lower than scores for the first text, suggesting novelty of task to be an affecting variable, rather than practice effect.

These findings supported the subjective assessment of the earlier reading and listening groups who judged passage (a) to be easier. Research by Neville (1988) has found that problems in remembering and understanding texts are not affected by their written or aural presentation but rather by the style and language of the text used. It was suggested that young readers who could read aloud and understand isolated words could still have problems constructing meaning from text. Similar comprehension problems occurred when young readers listened to text showing that the problem did not lie in decoding ability. It was thought to be connected to the subject's ability to process the input and not simply to inability to recall sentences (Oakhill, 1982). This finding is especially relevant to the current research.

The findings of Feasibility Study 6 supported those of Feasibility Study 1 as an assessment of textual difficulty i.e. that narrative text with its story–line is more easily processed but the results did not indicate cloze procedure to be better than free recall as an investigative procedure for the purposes of this research. The insertion of only individual words limits the freedom given to subjects to display the miscomprehensions they indicate in free recall responses. Cloze tests did not yield the quantity and variety of 'errors' which arose when six subjects recalled text in free writing and drawing.

3.4.7 *FEASIBILITY STUDY 7*

Preliminary questions:

11. *Does cloze procedure offer a useful method of assessing textual difficulty and pupil comprehension for the purposes of this research when subject number is greater than that of Feasibility Study 6? (N = 6).*

12. *Does cloze procedure indicate the same types of reader misconceptions as revealed by free recall responses?*

Because cloze procedure is frequently used by teachers to assess pupils' comprehension of printed text, and in order to get another estimate of the difficulty of a passage which had given rise to some interesting miscomprehensions, the *Jungle Book* text 'The Lost City' was presented as a cloze test. The cloze texts used in Feasibility Study 6 had involved only a small number of subjects and it was thought desirable to repeat the procedure with a larger sample (N28), before deciding for or against its use in the main study.

3.4.7.1 Material

The aforementioned *Jungle Book* text, 'The Lost City', was prepared as a cloze text

in a manner similar to those used in Feasibility Study 6 – i.e. 15 deletions per text – approximately every seventh word.

3.4.7.2 Subjects

The subjects were pupils in a composite PVI–PVII class in a six–teacher rural primary. Twenty–eight readers took part.

3.4.7.3 Results

TABLE 3:9

Results of Cloze Text – 'The Lost City'

Class	Number of Subjects	Target Response	Acceptable Response	Non–acceptable Response
PVI	7	29.5%	35.2%	35.2%
PVII	21	29.2%	34.9%	35.9%

3.4.7.4 Discussion

As a practical exercise the cloze texts were fairly well done and certain previously discovered misconceptions e.g. 'creepers' as insects instead of plants, did show up. 'Acceptable responses' were defined as reasonable alternatives to the target words. The scores did not yield a great deal of information concerning pupils'

comprehension of the passage as a unit of text, or add to the 'error' classification system. The ability to correctly fill in gaps in a text depends on the reader's ability to select words according to grammatical rules and the author's message in terms of meaning, language patterns and vocabulary. If a number of wrong responses are given the following responses are less likely to be correct as the difficulties are cumulative. The scores in this study would seem to indicate a 65% comprehension which is approaching frustration level.

On the other hand, as the readability level of 'The Lost City' was 12.5 years according to the Fog Index, the study suggested that pupils can produce reasonably satisfactory scores on cloze texts at or above their personal reading level and yet many misconceptions will not be revealed. Although readability levels are not very accurate or informative measures of textual difficulty, they give a guide and are in frequent use amongst teachers and publishers. Given the complicated nature of comprehension, the unreliability of readability formulae as predictors of grade level (Stokes, 1978) and the non-linear relationship between cloze scores and textual difficulty, the feasibility study suggests that although these measures have their uses, they conceal much of what matters in a pupil's interaction with text.

3.4.8 *FEASIBILITY STUDY 8*

Preliminary questions:

13. *Does factual text written in a narrative style produce the same types of error as fictional text in free recall responses?*

14. *Does readability level of text affect the type and quantity of errors produced in free recall responses?*

This study was designed to gauge the effects of factual and fictional text and readability level of material on pupil recall. Text may be written in a narrative or descriptive style. Hitherto, all the material used in pilot studies has been fictional and narrative. It was possible that factual material written in the same style would result in a different type of comprehension error.

3.4.8.1 Materials

A factual passage written in a narrative style was used. The subjects had recently returned from an excursion to York to see the Jorvik Viking Exhibition so the topic of Vikings was chosen with the added idea that effects of previous teaching would be obvious. Readability level was measured by the Fog Reading Index (Gunning, 1952) and the Fry Readability Graph (Fry, 1968) and it was important to know how it related to the error pattern.

Text	Propositions	Levels	Triples	Words	Fog Reading Age	Fry Grade Level
'The Viking Feast'	20	3	93	119	8.2	6

The extract came from *Time Traveller Book of Viking Raiders* (Civardo & Campbell, 1977; Appendix 1, No. 6).

3.4.8.2 Subjects

The small group used in Feasibility Study 1 was again used, i.e. pupils in PIV–PVII, aged 8–11 years. Seven pupils were present on this occasion.

3.4.8.3 Administration

Duplicated texts were distributed and retained during the exercise. As in Feasibility Study 3, pupils were asked to illustrate the text with a series of annotated drawings, the number of which was left to individual choice.

3.4.8.4 Results

TABLE 3:10

Average Number of Triples Recorded in Writing and Drawing with Factual Text Retained

Class	No. of Subjects	Summary	Illustration
PIV	2	25.5	12.5
PV	1	20	12
PVI	2	21	13.5
PVII	2	33	16.5

3.4.8.5 Discussion

A general pattern of results cannot be determined from such a small sample, but the older pupils record more triples i.e. items of information, in the illustrations but not in the summaries. Vikings were not actually mentioned in the text but most pupils realised from the clue 'Norway', that they were the subject of discussion, and considerable follow-through from the class visit to the Jorvik Viking Centre could be discerned. Viking ships, helmets and type of long-house were generally correctly drawn.

The lower reading level of the passage, together with the factual material, probably reduced the number of 'errors' in this exercise. Perhaps subjects could draw more

upon their historical knowledge as an aid to comprehension of text. The 'errors' which did appear could mostly be assigned to the categories already noted i.e. 'Justifications', 'Literal interpretation', 'Predominance of stereotypes', 'Influence of previous knowledge', 'Confusion of word meanings', 'Extraneous items', 'Transpositions', and 'Misinterpretations of explicitly stated facts'. A further developmental trend was indicated in the ability, which increased with age, to handle the concept of time in history. Younger children have difficulty in relating events in a time scale. A modern electric cooker appeared in a PIV drawing and electric light in a PV one. Passage of time is an abstract concept which requires a level of development not reached while the child is struggling with conservation of number (Piaget *et al.*, 1952).

The readability level of the passage appeared to affect the quantity but not the type of error. The factual text seemed to have a similar effect.

3.4.9 *FEASIBILITY STUDY 9*

Preliminary question:

15. *Do non-fiction passages produce the same numbers and types of errors as passages of fiction?*

This study was run to assess the effects of text type i.e. fiction/non-fiction, on number and pattern of errors as the previous studies had used fiction or factual material presented in a fictional style. The factual Viking information was presented in the context of a fictional family of the period. Factual material presented in a straight-forward information-giving manner might yield different types and numbers of 'errors'.

3.4.9.1 Materials

To find out if non-fiction passages when written in expository style produce the same categories of error as previously found in passages of fiction, four non-fiction texts were used as material for annotated pictures. The texts were equal in length to these previously used, and selected, with slight adaptation from school text books currently in use. The passages had not been previously studied by the subjects.

The non-fiction texts were *Feeding the World*, (Hunter, 1973); *The Policeman* (Philograph, 1967); *High Speed Trains* (Taylor, 1982); and *Fossil Fuels* (Lambert, 1982). The lengths, propositional analyses and readability levels of the chosen passages were in line with the fictional texts used (Appendix 1, Nos. 7–10).

Text	Propositions	Levels	Triples	Words	Fog Reading Age	Fry Grade Level
'Feeding the world'	17	3	78	119	12.90	10
'The Policeman'	20	2	85	119	10.85	7
'High Speed Trains'	14	2	94	119	13.40	7
'Fossil Fuels'	19	4	94	119	12.10	7

3.4.9.2 Subjects

The group used in Feasibility Studies 1, 2, 3, 5 and 8 – eight pupils aged 8–11 years in each of the four top primary classes (PIV–PVII), N = 8, in a single teacher rural school was again used as an easily accessible, multi-age sample.

3.4.9.3 Administration

Pupils were, as previously, asked to draw pictures to illustrate the text and to provide short explanations for each drawing. Work on texts *Feeding the World* and *The Policeman* was done from memory while that on *High Speed Trains* and *Fossil Fuels*, was done with texts retained. These variables were alternated so that the order of working was text withdrawn/text retained. This order was chosen to control for practice effects.

3.4.9.4 Results

TABLE 3:11

Classification of Errors Arising from Non-fiction Passages According to Retention or Withdrawal of Texts, and Mode of Presentation of Answers

Categories		Writing		Drawing		
		Text Withdrawn	Text Retained	Text Withdrawn	Text Retained	Total
2.	Confusion of word meaning				2	2
3.	Extraneous items			15	16	31
4.	Transpositions		3			3
5.	Influence of previous knowledge	2	4	30	13	48
6.	Misinterpretation of explicitly stated facts		2		6	8
	Total	2	9	45	37	93

The same categories of error appeared as in the studies carried out with passages of fiction, but they occurred to a lesser extent i.e. fewer errors were found in non-fiction studies. In three categories, 'Justifications', 'Literal interpretation' and 'Predominance of stereotypes', no errors were recorded across age groups in either mode of presentation.

The 'errors' in the drawing responses, of which there was the greater number, were subdivided in order to find out if there was a developmental effect and if similar 'errors' appeared according to whether the text was retained or withdrawn.

TABLE 3:12

Variation in Number of Errors Between Age Groups and According to Retention or Withdrawal of Non-fiction in Drawing Responses

Categories		Text Withdrawn				Text Retained			
		IV	V	VI	VII	IV	V	VI	VII
2.	Confusion of word meaning					1	1		
3.	Extraneous items	5	1	6	3	4	2	5	5
5.	Influence of previous knowledge	5	10	4	11	1	5	5	2
6.	Misinterpretation of explicitly stated facts	2	0	0	0	1	1	1	3
	Total	10	11	10	14	7	9	11	10
	Combined totals	45				37			

The following table shows the 'errors' appearing in Table 3:11 and Table 3:12 redistributed to give single totals for each class.

TABLE 3:13

Variation in Total Errors Made by Each Class Using Non-fiction Texts

Categories		IV	V	VI	VII
2.	Confusion of word meanings	1	1	0	0
3.	Extraneous items	9	3	11	8
4.	Transpositions		2	1	
5.	Influence of previous knowledge	8	18	10	13
6.	Misinterpretation of explicitly stated facts	3	1	1	3
	Total	21	25	23	24

Categories (1) 'Justifications', (7) 'Literal interpretation', and (8) 'Predominance of stereotypes' did not show any errors in Feasibility Study 9 and have been omitted from the above tables.

3.4.9.5 Discussion

In the results of studies of non-fiction passages, only two errors occurred in written work when the text was withdrawn. They were made by a PVII subject and arose from the 'Influence of previous knowledge'. (Contrary to what might

have been expected, nine written errors occurred when text was retained. Conversely, in the illustrations more errors (45) appeared when the text was withdrawn and 37 when it was retained). No errors occurred in either written or illustrated work, in the categories of 'Justification', 'Literal interpretation' or 'Predominance of stereotypes'. Feasibility Study 9 showed that non-fiction passages written in an expository style tended to produce fewer 'errors' than factual or fictional material written in a narrative style. Although some of the same categories of error arose as in using fictional texts, they covered fewer categories when these particular factual texts were used.

In part the difference in quantity of errors between fiction and non-fiction totals (Table 3:14) was due to the varying number of subjects. The experimental texts were distributed to available groups of children in normal class time, and only eight subjects took part in using non-fiction texts. These same subjects, however, were included in the sample of subjects using the fiction texts. The finding that average number of errors made per pupil on factual texts was 11.6 while those made on fictional texts averaged 7.5 supported the research of Neville (1988). The fact that some categories of error are not found in non-fiction texts, may be because pupils could draw to a greater extent on previous knowledge in a factual situation and thus avoid some pitfalls of the comprehension process. When readers have a concentrated body of relevant knowledge to bring to the text, they may use it as an aid towards understanding the material. Conversely, when the text is fictional it may be more necessary to use the imagination when extracting the author's message. It would seem to be more difficult to select relevant previous

knowledge when the number of possible interpretations of the text is wider in a fictional text. When handling factual material there is less scope for variations in answers. The slightly greater developmental trend indicated in factual studies might be due to the wider world knowledge of the older subjects. That might cause interference effects (Bransford & Johnson, 1973).

Results obtained for fiction and non-fiction passages were next compared (Table 3:14) to find if there were significant differences in the overall pattern of categories of errors, between the two types of texts. As numbers of subjects and studies were unequal, results were not directly comparable but indicate spread across categories.

TABLE 3:14

Frequencies of Errors by Category in Comprehension of Fiction and Non-fiction Passages

Categories		Fiction Total	%	Non-fiction Total	%
1.	Justifications	13	4.5	0	0
2.	Confusion of word meanings	12	4.2	2	2.2
3.	Extraneous items	91	31.8	31	33.3
4.	Transpositions	25	8.7	3	3.2
5.	Influence of previous knowledge	72	25.2	49	52.7
6.	Misinterpretation of explicitly stated facts	40	14.0	8	8.6
7.	Literal interpretation	12	4.2	0	0
8.	Predominance of stereotypes	21	7.3	0	0
	Total	286		93	

3.4.9.5.1 *Discussion of Table 3:14*

Two categories – 'Extraneous items' and 'Influence of previous knowledge' figured notably in both fiction and non-fiction situations, while three categories 'Justifications', 'Literal interpretation' and 'Predominance of stereotypes', did not

occur in the non-fiction scores. It is suggested that the first two categories are linked in that they arise from the world knowledge and experience with which the child approaches the text. That could be drawn upon in a passage be it fiction or non-fiction.

The three categories which did not figure in the non-fiction errors, would possibly derive from techniques employed in making sense of imaginative material, rather than in handling facts. The field of possible solutions is very much wider in fiction than in non-fiction, which has more clearly defined boundaries.

A second regrouping of the foregoing results was carried out to ascertain if differences existed in the overall pattern of categories when results acquired from memory exercises were compared with these collected when texts had been retained.

TABLE 3:15

Frequencies of Errors by Category for Text-retained Exercises and Memory Exercises Using Fiction and Non-fiction

Categories		Memorisation Total	%	Text Retained Total	%
1.	Justifications	8	5.2	5	2.2
2.	Confusion of word meanings	9	5.9	5	2.2
3.	Extraneous items	35	22.9	87	38.5
4.	Transpositions	14	9.2	14	6.1
5.	Influence of previous knowledge	50	32.7	71	31.4
6.	Misinterpretation of explicitly stated facts	14	9.2	34	15.0
7.	Literal interpretation	6	3.9	6	2.7
8.	Predominance of stereotypes	17	11.1	4	1.8
	Total	153		226	

3.4.9.5.2 *Discussion of Table 3:15*

Three categories of error predominated in both situations. These were 'Extraneous items', 'Influence of previous knowledge' and 'Misinterpretation of explicitly stated facts'. The total subject numbers were approximately the same whether texts were

withdrawn or retained, so it seems notable that there were many more examples of each of these categories when there was unrestricted access to the texts. Intuitive expectation would lead to the assumption that these categories in particular where the information of the answers could easily be checked against the information of the text, would appear to a lesser extent when the text was available for reference.

As subjects did not use the same texts for memorisation and retention, the differences may have arisen because of specific factors in individual passages. Another possibility is that the retained text may have acted as a prompt for further elaboration, whereas memory and selective processing could have limited the amount of material recalled. A third comparison was made to show the distribution of errors in fiction and non–fiction texts, into categories (Table 3:16). They were divided according to their source in written or illustrated protocols.

TABLE 3:16

Frequencies of Error by Category in Written and Illustrated Protocols with Fiction and Non-fiction Texts

Categories		Written Recall Total	%	Illustrated Recall Total	%
1.	Justifications	11	13.4	2	0.7
2.	Confusion of word meanings	5	6.1	9	3.0
3.	Extraneous items	16	19.5	106	35.7
4.	Transpositions	22	26.8	6	2.0
5.	Influence of previous knowledge	16	19.5	105	35.4
6.	Misinterpretation of explicitly stated facts	12	14.6	36	12.1
7.	Literal interpretation	0	0	12	4.0
8.	Predominance of stereotypes	0	0	21	7.1
	Total	82		297	

3.4.9.5.3 *Discussion of Table 3:16*

The same three categories as in Table 3:15, 'Extraneous items', 'Influence of previous knowledge' and 'Misinterpretation of explicitly stated facts', predominated in the illustrated recall suggesting again that the influence of world knowledge is

strong enough to supplant the information given in the text (Spiro, 1977).

Scrutiny of the foregoing results led to the decision to drop the fiction/non-fiction distinction as the same categories of error appeared in the use of texts of both types. More categories of error, however, arose when fictional texts were used. It was decided to maintain the writing/illustration and the memory/retention contrasts and to examine them experimentally at four developmental levels, for the main study.

Four of the above texts were selected, 'Jungle Train', 'The Indian City', 'The Golden Dragon', and 'The Viking Feast'. These were fiction extracts or written in an imaginative style as fiction texts yielded higher totals of 'errors'.

3.5 RESULTS OF COMBINED FEASIBILITY STUDIES

When the categories of regularly occurring errors had been decided upon, those of each type found in the combined feasibility studies were assigned to the appropriate category. The categories were numbered for convenience. The following table shows the total number of classified 'errors' collected in the foregoing feasibility studies and the categories to which they had been assigned.

TABLE 3:17

Frequencies of Errors by Category in Writing/Drawing and Retention/Withdrawal Conditions From Feasibility Studies Using Fiction Texts

Categories		Writing		Drawing			
		Text Withdrawn	Text Retained	Text Withdrawn	Text Retained	Total	%
1.	Justifications	7	4	1	1	13	4.5
2.	Confusion of word meaning	3	2	6	1	12	4.2
3.	Extraneous items	4	12	16	59	91	31.8
4.	Transpositions	9	10	5	1	25	8.7
5.	Influence of previous knowledge	5	5	13	4	72	25.2
6.	Misinterpretation of explicitly stated facts	7	3	7	23	40	14.0
7.	Literal interpretation	0	0	6	6	12	4.2
8.	Predominance of stereotypes	0	0	17	4	21	7.3
	Total	35	36	71	144	286	

3.5.1 *DISCUSSION OF TABLES 3:17, 3:18 AND 3:19*

The results showed the illustrations to produce more examples of error in the selected categories than the written protocols. This was true whether the texts had been withdrawn or retained, but surprisingly there were more drawing errors when

the text had been retained. Three categories, 'Extraneous items', 'Influence of previous knowledge' and 'Misinterpretation of explicitly stated facts', produced 91 of the 104 errors found in the illustrated protocols when pupils had been allowed unlimited access to the text. Such errors seemed to derive from the reader's experience and knowledge and not specifically from the words and sentences forming the text i.e. they did not derive from difficulties of vocabulary or sentence construction. It would seem that with free access to the text came further embellishment of the answers, and that the additions came from reader knowledge prompted by individual words and phrases in the passage. When the meaning and information of the text had to be held in the memory these 'prompts' were not to the same extent available. The text did not appear to be used to correct miscomprehensions but as a jumping off point for the reader's ideas.

Several categories of error included examples from passages of each level of reading difficulty in the fiction passages. To see if particular categories pertained to specific age groups, the errors were linked to the classes in which they originated.

Table 3:18 shows the distribution of errors found in feasibility studies in written protocols allocated to the age groups which produced them and divided into those which appeared when text was retained and those which appeared when text was withdrawn.

TABLE 3:18

Variation in Errors by Category Age Groups From Examples Found in Feasibility Studies

		Writing							
		Text Withdrawn				Text Retained			
Categories		PIV	PV	PVI	PVII	PIV	PV	PVI	PVII
1.	Justifications	2	0	2	3	0	0	1	3
2.	Confusion of word meanings	0	1	0	2	0	1	0	1
3.	Extraneous items	1	1	1	1	0	0	5	7
4.	Transposition	1	2	1	5	2	0	5	3
5.	Influence of previous knowledge	0	0	2	3	2	1	2	0
6.	Misinterpretation of explicitly stated facts	1	1	3	2	2	1	0	0
7.	Literal interpretation	0	0	0	0	0	0	0	0
8.	Predominance of stereotypes	0	0	0	0	0	0	0	0
	Total	5	5	9	16	6	3	13	14

Table 3:19 shows the distribution of errors occurring in the drawing protocols of the feasibility studies allocated to the relevant age groups and divided as to whether the text was retained or withdrawn.

TABLE 3:19

Variation in Errors by Category Between Age Groups From Examples Found in Feasibility Studies

		Drawing							
		Text Withdrawn				Text Retained			
Categories		PIV	PV	PVI	PVII	PIV	PV	PVI	PVII
1.	Justifications	0	0	0	1	0	0	1	0
2.	Confusion of word meanings	0	0	2	4	0	1	0	6
3.	Extraneous items	1	3	4	8	4	2	23	30
4.	Transposition	0	0	2	3	0	0	1	0
5.	Influence of previous knowledge	3	0	5	5	12	8	17	12
6.	Misinterpretation of explicitly stated facts	1	2	3	1	2	2	3	16
7.	Literal interpretation	1	0	0	5	1	0	2	3
8.	Predominance of stereotypes	0	2	8	7	2	1	0	1
	Total	6	7	24	34	21	14	47	62

Table 3:20 shows the combined totals of 'errors' in reading and drawing protocols assigned to categories and the appropriate age groups. They are divided into those found when text was withdrawn and those appearing when text was retained.

TABLE 3:20

Variation in Errors by Category According to Age Groups and Retention or Withdrawal of Text

Categories		PIV	PV	PVI	PVII	Text Withdrawn	Text Retained
1.	Justifications	2	0	4	7	8	5
2.	Confusion of word meaning	0	3	2	7	9	3
3.	Extraneous items	6	6	33	46	26	71
4.	Transposition	3	2	9	11	14	11
5.	Influence of previous knowledge	17	9	26	20	18	54
6.	Misinterpretation of explicitly stated facts	6	6	9	19	14	26
7.	Literal interpretation	2	0	2	8	6	6
8.	Predominance of stereotypes	2	3	8	8	17	4
	Total	38	29	93	126	106	180

3.5.2 *DISCUSSION OF TABLE 3:20*

Because of the uneven distribution of subjects across the four classes, developmental trends could not be definitely distinguished, but the results indicated that error categories were common to age groups i.e. there was no apparent difference between the errors produced by younger and older readers. Considerably more 'errors' were noted when texts were retained and these occurred mostly in illustrations.

3.5.3 *VALIDATION OF TEXTS*

Preliminary question:

16. *To what extent are the four selected texts, 'Jungle Train', 'Lost City', 'Golden Dragon' and 'Viking Feast', passage dependent?*

Comprehension of pupils is often assessed according to their skill in answering questions based on passages of text. This practice is based on the assumption that there is a direct link between the reading and answering i.e. that the latter depends on the former being correctly carried out. Tuinman (1973) when studying standardised tests in America discovered that this was not necessarily so and that many questions could be answered on the basis of prior knowledge or use of the information contained in the questions. To determine the likely contribution of background knowledge and textual content in understanding of the selected text a feasibility study was carried out after the manner used by Tuinman.

3.5.3.1 Materials

Four texts, 'Jungle Train', 'Lost City', 'Golden Dragon' and 'Viking Feast' as already used in feasibility studies, plus 10 questions on each. The questions were of the type regularly used in class exercises – a mixture of literal, inferential and evaluative (Appendix 1, Nos. 11–14).

3.5.3.2 Subjects

The subjects were groups of PVI and PVII pupils from composite classes and had not previously participated in any of the feasibility studies. N = 36.

3.5.3.3 Administration

The task was divided between two sessions, each approximately an hour in length. On each occasion nine pupils were given a text with questions while the others were given 10 questions without an accompanying text. After half an hour, the groups reversed the process with the remaining texts and questions. In the second session the process was repeated with the remaining 18 pupils. On this occasion the questions which had previously been accompanied by texts, were answered without them and vice-versa. Pupils were randomly allocated to groups with age groups matched as closely as possible.

3.5.3.4 Results

TABLE 3:21

Average Number Correct When Answering With and Without Selected Texts

Text	With Text	Without Text
Viking Feast	8.25	4.25
Golden Dragon	6.61	4.77
Lost City	6.56	3.38
Jungle Train	6.77	4.94
Possible score	10.00	

3.5.3.5 Discussion

'The Lost City' proved to be the text most passage dependent while there was little difference amongst the other three. From previous knowledge pupils were able to use more appropriate information about Vikings, dragons and jungles than they could about cities. The concept of a ruined and deserted city may have been perhaps too much at odds with their knowledge of busy crowded streets and large housing estates. When texts were used, the questions about the 'Viking Feast' were best answered although this was not the passage with the lowest reading level. As Vikings are frequently encountered as a history topic it might have been expected that the 'Viking Feast' would be the least passage dependent task but this was not so. Allowing that the difficulty of the four sets of questions, and the groups of

pupils may not have been exactly matched, the study suggests that PVI–PVII pupils have to read these texts carefully in order to understand them completely but that on each they probably have a useful degree of background knowledge to aid their comprehension. It suggests therefore that this selection of random texts is valid for the purpose of assessing pupils' comprehension of text, at the upper end of the primary age range. Tuinman found that passage dependency decreased from Grade 4 to Grade 6, possibly as pupils' general knowledge increased. The selected texts are therefore likely to be more valid when used as a means of assessing textual understanding of PIV and PV pupils.

3.6 CONCLUSIONS OF FEASIBILITY STUDIES

The results of the feasibility studies suggested a number of variables – child's knowledge of purpose of task as recall, textual factors, individual characteristics, age of subject and mode of presentation, which could influence results in research of this type.

The studies demonstrated that the use of propositional analysis did not reveal the large number of misconceptions which subjects could hold about texts while recording fairly high scores in terms of recorded triples. Slight developmental trends were noted in the propositional analysis scores specially in results of illustrated protocols but the sample was too small to make generalisations. They were less evident when texts were fiction than when non–fiction texts were studied, suggesting that when material was imaginative, the greater world

knowledge of the older pupils was of less use in comprehension tasks. Similar misconceptions appeared across the age levels.

Cloze procedure, likewise, failed to reveal the extent of misunderstanding displayed in free response protocols and readability formulae seemed useful only in ranking texts in order of difficulty. Most of the revealed errors of misconception made by the subjects could be allocated to eight different categories. The definition of 'errors' is important. Assuming that the purpose of reading is to absorb the message of the author, outcomes which differ from the original are classified as 'errors' (Siegel 1983). That does not mean that verbatim reproduction is expected but rather recall of the items of information as carried in the text. Departures from what the average informed reader might take to be the textual message are classed as 'errors' for the purposes of this research.

This is an assumption of reading purpose on which teachers base most of their assessment of pupil assignments. They also assume that the responses made by pupils reflect the knowledge structures they have formed through their interaction with printed text.

How far a reading outcome is a personal thing or a reproduction of the original, has been debated (Golden & Guthrie, 1986). Bartlett (1932) believed that text was stored in memory in a schematic form and that reconstruction from this theme in combination with stored knowledge led to 'errors' in recall. He saw 'errors' in retention as an indication of the way in which the reader processed text in memory.

From their studies of level of encoding and retention of prose, Dooling & Christiassen (1977) found 'errors' to contain important clues as to how the text had been encoded. Low level encoding was thought to preserve specific features of the text while high level encoding preserved the theme. They also found support for Bartlett's constructivist view.

An unexpected finding of the feasibility studies was that more errors were recorded when texts were retained during an exercise than when they were withdrawn. This suggested that texts were being used as prompts for further embellishment of the written or illustrated work. When texts were retained they appeared to be used less for checking information than as springboards for the imagination. When texts were held in memory, selective processing could have removed some of the original information beyond the possibility of recall. The categories into which the misconceptions seemed to fall were 'Justifications', 'Confusion of word meanings', 'Extraneous items', 'Transpositions', 'Influence of previous knowledge', 'Misinterpretation of explicitly stated facts', 'Literal interpretation' and 'Predominance of stereotypes'. Developmental trends could not be definitely distinguished in 'error' scores but 'error' categories appeared common across the age groups i.e. readers made the same types of 'error' at each class level. A developmental effect was indicated, however, when non-fiction texts were used. This is suggested to be due to the greater world knowledge on which older readers could draw. It appeared that world knowledge could supplant information explicitly stated in the texts on occasion. Some categories did not appear when non-fiction texts were used i.e. 'Literal interpretation', 'Justification' and

'Predominance of stereotypes', possibly as there was less opportunity for personal opinions to intrude.

It became apparent from examination of the feasibility studies that errors appeared, which could not readily be allocated to the category system used. It was therefore necessary to modify the categories to take account of those errors and find a place for them.

3.7 MODIFICATION OF CATEGORY SYSTEM

Study of pupil errors showed the need for one alteration and two additions to the category system.

One group of errors arose from drawing, when a tendency to focus on one word, and to ignore the remainder of the information, became apparent. As the key word usually appeared early in the phrase, it would appear that the significance of that word, took precedence over the rest of the phrase. For example "The longhouse rang" showing only the building and "the train ran through the jungle" showing only a train. This showed a disregard for, rather than misinterpretation of, explicitly stated facts.

A category of error which appeared in the feasibility studies arose from the free writing and took the form of 'parroting', or repetition of phrases and parts of sentences from text, in a manner which demonstrated lack of coherence and

comprehension e.g. "... and wisps of smoke under his limbs and huge coiled tail and about him on all sides lay gold, gems and silver red-stained in the lights". A category 'Reproduction' was added to the category system, and category 6 redesignated 'Disregard of explicitly stated facts'. 'Confusion of word meanings' was felt to be over-inclusive and was divided into two categories, the second category being 'Discrimination errors'.

Word association tasks to estimate prior knowledge, and cloze texts to indicate reading levels, did not yield useful additional information. When estimating the difficulty of the texts, in subsequent discussion readers seemed unaware of their misconceptions and appeared to concentrate on words and phrases rather than on sentences and the links between them.

3.8 SUMMARY

The feasibility studies were conducted mainly with a view to finding suitable methods, in practical and informational terms, to use in the main study where the main aim was to study the encounter of child and text in independent reading in the classroom situation, and discover sources of miscomprehension. The studies indicated several variables which could affect comprehension and that propositional analyses of responses failed to show many misconceptions held by the pupils. These could be picked up from other information produced by subjects in their free recall protocols, both written and illustrated, and could be allocated to ten categories, 'Justifications', 'Confusion and word meanings', 'Extraneous items',

'Transpositions', 'Influence of previous knowledge', 'Disregard of explicitly stated facts', 'Literal information', 'Predominance of stereotypes', 'Discrimination errors' and 'Reproduction'.

It was decided that assessment of written and illustrated free response protocols arising from reading assignments using fictional text could be a fruitful method to pursue in the main study and that misconceptions rather than correct comprehension would be studied. Pupils appeared to find free recall tasks acceptable and stress-free. Since the examples of miscomprehension found in the feasibility studies appeared to fall into ten categories the category system developed could prove a useful tool for assessment of comprehension but first would have to be validated to see if it could be more generally used by teachers in classrooms.

3.9 VALIDATION TRIALS

There was from feasibility studies a considerable number of response protocols in written and illustrated presentation modes which could be used to run validation trials for the development of the category system.

Examination of the free recall worksheets showed many errors, when 'error' was taken to mean divergence from the textual meaning as perceived by the author of this thesis. These errors appeared to fall into categories and there was no apparent difference between the types of error made by younger and older readers. The

errors occurred in both written and illustrated recall and with fiction and non-fiction although fictional texts produced the greater quantity. Study of these errors seemed to offer useful clues as to how the text was processed.

From the nine feasibility studies which involved both fiction and non-fiction texts and used subjects aged 8-11, the following findings influenced the design of the main study. Propositional analysis, which measured recall on units of information, showed higher scores when applied to written protocols than when applied to illustrated ones, but a large amount of interesting extraneous material appearing in both types of answer, was not indicated by propositional analyses' scores. Both written and illustrated free recall worksheets displayed inclusions and misconceptions which would not have been available in a straight-forward question and answer exercise although that is the type of response commonly sought in classrooms. The system of propositional analysis records only the items of information recalled and does not examine the links between them but correct formation of these links is necessary if texts are to be properly understood. For the main study therefore, assessment by means of propositional analysis was discarded, and the focus moved to 'error totals' as arranged in categories.

Four excerpts from children's fiction and already used in the feasibility studies, were selected for further use in both drawing and writing situations, and in conditions where the text was retained as well as when it was withdrawn.

The chosen texts as mentioned in the feasibility studies were 'Jungle Train', 'Viking Feast', 'Lost City' and 'Golden Dragon' and they were used in both rural and urban schools and with each of the PIV–PVII primary classes i.e. pupils aged from 8–11 years.

Once the experimental subjects' sets of material had been extracted and set aside, the next step was to scrutinise the work produced by the non–target pupils and to list the errors into the categories already described in feasibility studies i.e. 'Justifications', 'Confusion of word meanings', 'Extraneous items', 'Transpositions', 'Influence of previous knowledge', 'Disregard of explicitly stated facts', 'Literal information', 'Predominance of stereotypes', 'Discrimination errors' and 'Reproduction'.

3.10 VALIDATION OF THE CATEGORY SYSTEM

The category system was the method selected to group similar and regularly recurring types of 'error' together to show that there was across the work of the subject sample a pattern of miscomprehensions. As the bulk of the 'errors' which appeared in the feasibility and main study extra protocols, appeared to fit into this pattern it seemed that if teachers could recognise these error types in the work of their pupils, they would have a useful starting point from which to tackle comprehension problems in their classes.

Some 'errors' were obviously more easy to classify than others but it was hoped that with 10 assessors a majority opinion would be reached on each one. It would seem likely to be easier for a class teacher to understand the reason for or trace the source of 'errors' made by members of his or her class, than for an objective assessor with no personal knowledge of the subjects to do so, but objective assessment would give a more general measure of the validity of the category system. From examination of the errors listed, category definitions were drawn up and coded A1–E and grouped as follows.

a. *Categories Of Error Which Are Child–Centred*

This type of error would seem to originate in knowledge or experience which the child brings to the interaction with the text. The resulting interpretation seems plausible to the reader in the light of that knowledge and information gleaned from the text.

Example: Guest bearing flowers to Viking Feast.

Categories Of Error Which Are Child–Centred:

A1 – Extraneous items.

A2 – Predominance of stereotypes.

A3 – Influence of previous knowledge.

b. *Categories Of Error Which Are Text-Centred*

This type of error arises from some faulty interaction with the printed word. It may have been misread or misunderstood but from that interaction the child constructs the meaning of the passage. Certain words may have special significance for the reader and assume an importance disproportionate to that intended by the author.

Example: Creepers drawn as insects instead of plants.

Text-Centred Errors:

B1 - Confusion of word meanings.

B2 - Disregard of explicitly stated facts.

B3 - Discrimination errors.

c. *Categories Of Error Which Come From Surface Reading*

These errors appear to arise from a surface reading of the text and failure to realise any deeper meaning behind the actual printed words.

Example: Bell on roof to illustrate "The longhouse rang with laughter".

Surface – Reading Errors:

C1 – Literal information.

C2 – Reproduction.

d. *Categories Of Error Which Derive From 'Effort After Meaning'*

Bartlett (1932) used the term "effort after meaning" to describe the reconstructions put on the text by the reader in the effort to make sense of it and reach an acceptable understanding of it.

Example: "The king's elephants had a thurst so they eat the jucie grass", to explain misreading of 'thrust' as 'thirst'.

Errors Demonstrating 'Effort After Meaning':

D – Justifications.

E – Transpositions.

The following lists of categories were prepared for distribution, as they would make comparison of definitions easier for markers. Two examples of each category of error were given as one was felt to be inadequate.

e. *Category List And Instructions As Distributed To Markers On First Validation Trial*

These error lists are composed of things which children have drawn or written in recounting these passages which they had read and retained for reference during the writing and drawing exercises.

Please enter the appropriate code letter and number which you consider to be appropriate, opposite each error, with reference to the definitions and texts.

A1 *'Extraneous items'*. Extras which do not contribute to the meaning of the text. Although not mentioned in the text, and possibly out of place in the given context, they fit in with the reader's picture of the scene.

e.g. 1. Tunnel for jungle train when no tunnel is mentioned.

2. The inclusion of the sun in the illustration.

A2 *'Predominance of stereotypes'*. Over–ruling of given information apparently in relation to a fixed idea that 'things are so'.

e.g. 1. A green dragon when passage refers to a golden one.

2. Monkeys in a cage and humans outside instead of vice–versa.

A3 *'Influence of previous knowledge'*. Facts which are wrong in the given context but arise from knowledge previously acquired by the reader. They do contribute to the reader's visualisation of the scene.

e.g. 1. Wigwams in the Indian city arising from reader's concept of 'Indian'.

2. Sailor with telescope in crow's nest of Viking boat, wrongly connecting two items which have to do with boats but belong to different periods of history.

B1 *'Confusion of word meaning'.* Misinterpretation arising from selection of word meaning which does not fit in the context.

e.g. 1. Dragon drawn laying an egg, derived from "there he lay".

2. 'Battlement is people fighting' arising from confusion with "battle".

B2 *'Discrimination errors'.* Misunderstanding arising from visual misreading of words, supported by reader's assumptions.

e.g. 1. 'Costly bed' as "cosy bed".

2. 'Palace' read as 'place'.

B3 *'Disregard of explicitly stated facts'.* Contradiction of facts clearly expressed in passage due to focus on individual key words or fragments.

e.g. 1. A walking dragon when it was described as 'fast asleep'.

2. Passenger giving banana to monkey rather than vice-versa as stated.

C1 *'Literal information'*. Surface reading of text, displaying failure to understand underlying metaphorical ideas.

e.g. 1. 'Ting a ling' sounds coming from longhouse and derived from 'The longhouse rang'.

2. 'A king built it' resulting in drawing of king with crown, trowel and bricks.

C2 *'Reproduction'*. Verbatim presentation of given words and phrases, showing that they have not been absorbed and understood.

e.g. 1. 'A thrumming came from his jaws and lay piles of gold gems' given as a section of summary.

2. 'The ship was loaded with goods and a huge feast' as section of summary.

D *'Justifications'*. Wrong explanations offered to reconcile apparently discrepant facts due to misunderstanding of the given text.

e.g. 1. 'The dragon's wings were folded so he could see his gems' to explain folded wings.

2. 'There must have been a battle because a city was ruined' to explain the condition of the city.

E *'Transpositions'*. Descriptive words and phrases transferred from their place in the text and attached to other words or ideas in the text.

e.g. 1. 'The elephants were in the battlements', when they were described as having lived in the courtyard, and 'battlements' occurred elsewhere.

2. 'The animals were upset', instead of the passenger as stated.

These definitions together with lists of 15 errors from each text were circulated to ten assessors from a wide geographical area including class teachers, both primary and secondary, head teachers and college lecturers.

3.10.1 *RESULTS*

Over four broad categories the level of agreement between teachers reached 71.6% and agreement with author classification was 65.3%. Full details of this validation trial are given in Appendix 1, Nos. 15–22.

Tables 3:22 and 3:23 show the main areas of confusion in the classification of the errors into categories.

TABLE 3:22

Summary of Teacher Responses in Four Major Categories – First Classification Trial

Item	Feast	Dragon	City	Train	Item	Feast	Dragon	City	Train
		Category A					*Category B*		
1	8	0	4	7	1	2	9	5	1
2	10	10	1	1	2	0	0	0	2
3	1	0	4	6	3	7	10	0	2
4	0	1	8	0	4	2	9	2	2
5	0	0	10	3	5	5	2	0	5
6	0	0	1	10	6	9	3	8	0
7	8	7	0	7	7	0	0	0	0
8	9	2	10	1	8	1	8	0	8
9	9	0	2	2	9	1	4	0	1
10	8	1	0	10	10	1	9	3	0
11	3	0	0	2	11	3	3	8	8
12	8	5	5	4	12	1	2	3	2
13	0	9	9	5	13	1	1	0	2
14	6	7	5	2	14	3	0	0	1
15	7	0	4	0	15	3	3	6	0
Total	77	42	63	60		39	63	35	35
		Category C					*Category D and E*		
1	0	1	1	1	1	0	0	0	1
2	0	0	7	0	2	0	0	2	7
3	1	0	0	1	3	1	0	6	1
4	8	0	0	1	4	0	0	0	7
5	3	6	0	0	5	1	2	0	0
6	0	5	0	0	6	0	2	1	0
7	2	1	9	2	7	0	2	1	0
8	0	0	0	1	8	0	0	0	0
9	0	1	4	6	9	0	5	4	0
10	0	0	4	0	10	1	0	3	0
11	1	3	1	0	11	3	4	1	0
12	1	2	1	1	12	0	1	1	3
13	9	0	1	0	13	0	0	0	3
14	0	1	0	5	14	4	2	4	3
15	0	6	0	6	15	0	1	0	2
Total	25	26	28	24		7	19	23	27

Table 3:22 shows the spread of teacher responses across the four main categories and for each item of the four texts. These main categories were defined as follows:

Category A – Child–centred errors.

Category B – Text–centred errors.

Category C – Errors arising from surface reading of text.

Category D and E – Errors demonstrating effort after meaning.

Out of the 600 possible responses there were seven nil responses, four on the Train text and three on the Feast text. They were made by three different markers and concerned separate items so there was no indication of a particular 'error' presenting unusual difficulty of classification.

TABLE 3:23

Inter-Teacher Agreement - First Classification
in Four Major Categories

(Highest frequency of occurrence out of 10)

Item	Feast	Dragon	City	Train
1	8	9	5	7
2	10	10	7	7
3	7	10	6	6
4	8	9	8	7
5	5	6	10	6
6	9	5	8	10
7	8	7	9	7
8	9	8	10	8
9	9	5	4	6
10	8	9	4	10
11	3	4	8	8
12	8	5	5	4
13	9	9	9	5
14	6	7	5	4
15	7	6	6	7
Total	114	109	104	102
Average	7.65	7.27	6.93	6.80
Average %	76%	72%	69%	68%

The average inter-teacher agreement over the four main categories of error was 72% as previously reported in MacMartin (1989). The highest level of agreement was reached in assessing the Feast text and the lowest, 68% in the Train text.

TABLE 3:24

Researcher–Teacher Agreement in Major Categories

(Highest frequency of occurrence out of 10)

Item	Feast	Dragon	City	Train
1	8	9	5	7
2	10	10	7	7
3	7	10	6	6
4	2	9	8	7
5	1	6	10	3
6	9	3	8	10
7	8	2	9	7
8	9	8	10	8
9	9	5	4	6
10	8	9	3	10
11	3	3	8	8
12	8	2	5	3
13	9	9	9	3
14	3	7	5	3
15	7	1	6	7
Total	101	93	103	95
Average	6.73	6.20	6.87	6.33
Average %	67%	62%	69%	63%

Average researcher–teacher agreement in major categories 65.3%.

The average level of agreement between the teachers and researcher over the four main categories was 65.3%. The highest level of agreement over classification of items 69% was reached in the City text while the lowest, 62%, occurred in allocating the items in the Dragon text to categories.

TABLE 3:25

Inter–Marker Agreement Over Four Main Categories

Marker	1	2	3	4	5	6	7	8	9	10	Researcher	Total
1	0	42	36	35	34	31	31	34	31	37	43	354
2	42	0	38	38	39	33	38	37	37	44	45	392
3	36	38	0	34	30	34	28	35	27	43	40	345
4	35	38	34	0	32	28	25	30	31	36	39	328
5	34	39	30	32	0	31	28	32	37	33	38	334
6	31	38	34	28	31	0	51	34	31	35	40	353
7	31	33	28	25	28	51	0	30	28	30	35	319
8	34	38	35	30	32	34	30	0	29	39	36	336
9	31	37	27	31	37	31	28	29	0	33	34	318
10	37	44	43	36	33	35	30	39	33	0	41	371
Researcher	43	45	40	39	38	40	35	36	34	41	0	391
Total	354	392	345	328	334	353	319	336	318	371	391	

Table 3:25 shows the inter–marker level of agreement across the four main categories to be 58.2%. The calculation was made to isolate any assessor who was markedly in disagreement with the others. Marker number 2 showed the highest level of agreement with the other ten markers included in the research while marker number 9 showed the least.

TABLE 3:26

Differences Between Teacher and Researcher Allocation of Items to Ten Categories

Teacher Classification		Researcher Classification A1	A2	A3	B1	B2	B3	C1	C2	D	E	
A1	Extraneous items	0	12	21	1	5	6	3	0	6	8	
A2	Predominance of stereotypes	7	0	14	1	1	3	3	1	0	4	
A3	Influence of previous knowledge	14	26	0	6	1	2	2	0	6	6	
B1	Confusion of word meaning	1	2	11	0	2	1	4	3	2	3	
B2	Discrimination errors	0	0	0	2	0	0	0	0	0	1	
B3	Disregard of explicitly stated facts	0	4	6	2	3	0	0	2	6	12	
C1	Literal information	3	4	1	14	0	3	0	7	1	1	
C2	Reproduction	1	1	0	1	0	1	0	0	10	13	
D	Justification	2	3	0	3	0	1	1	2	0	3	
E	Transpositions	0	0	1	3	0	1	2	7	3	0	
Total divergence		28	52	54	33	12	18	15	22	34	51	319
Possible divergence		60	80	80	50	40	80	40	40	50	80	600
Percentage divergence		46.6	65.0	67.5	66.0	30.0	22.5	37.5	55.0	68.0	63.8	

Table 3:26 shows how teachers allocated errors to categories when they differed from the researcher's view about items.

In major categories the highest level of disagreement occurred in Category A – Child–centred errors (59.7%) and Category D and E – Errors demonstrating effort after meaning (65.9%). There was less disagreement about Category B – Text–centred errors (39.5%) and Category C – Errors arising from surface reading (46.2%). Teachers agreed more about errors which arose from the general area of text than about those which may have come from the child.

TABLE 3:27

Relationship Between Majority View of Teachers and Distribution of Errors Across Other Categories.

Teacher – Majority Classification		Classification Given by Other Teachers										Total Divergence
		A1	A2	A3	B1	B2	B3	C1	C2	D	E	
A1	Extraneous items	0	9	15	3	0	9	2	1	6	3	48
A2	Predominance of stereotypes	10	0	22	4	0	2	4	1	2	0	45
A3	Influence of previous knowledge	12	6	0	3	0	2	1	0	0	1	25
B1	Confusion of word meaning	1	0	7	0	1	2	1	0	1	0	13
B2	Discrimination errors	5	1	1	2	0	2	0	0	0	0	11
B3	Disregard of explicitly stated facts	0	3	2	1	3	0	3	4	1	0	17
C1	Literal information	3	3	2	9	1	1	0	3	2	5	29
C2	Reproduction	1	0	1	3	0	5	4	0	4	10	28
D	Justification	1	0	4	1	0	1	0	1	0	0	8
E	Transpositions	5	2	3	2	1	5	0	6	2	0	27
												251

Most disagreement about category classification appeared to lie within major groups, especially in child–centred errors Group A. There was also difficulty in

distinguishing between 'Confusion of word meaning' and 'Literal information', but when assessing in a purely objective situation it is difficult to guess if a child did not understand alternative word meanings or merely treated the text at face value.

3.10.2 *DISCUSSION*

Little variation between separate text results was apparent in either situation. Examination of 50 individual items which did not reach 80% inter-teacher agreement level, found 13 of them to belong to major category (D+E), according to researcher classification. Category (D+E) had seemed similar to Bartlett's "effort after meaning", and consisted of transpositions and justifications, which were adopted by the reader in an attempt to make sense of the text. Bartlett (1932) used the term to explain the constructive processes used by subjects in reading and understanding a story.

Origin of errors in written or illustrated protocols, did not appear to influence the variation of opinion over classification of individual items, although the fact that errors in illustration were described instead of presented as drawings because of the practical difficulty of distribution of drawings to markers meant that markers did not have access to the same material as the author, when deciding upon classification. There was no tendency however, for either the written or illustrated errors to show particular lack of agreement amongst markers.

Greater familiarity with texts might have made transpositions, (Category E), more obvious but markers had only limited time (because of their other commitments) to spend on classifying 60 items. Low agreement about classification of some items could be due to ambiguity of these items and not to validity of category system but it could also suggest limitations in the applicability of the category system.

When the number of occasions when teachers failed to agree with each other about error classification was calculated, results showed that the main area of inter-category confusion lay in the child-centred categories. Most of the occasions when it proved difficult to separate categories from each other arose in making the distinction between 'Extraneous items' and examples showing 'Influence of previous knowledge'. Without the teacher's knowing a child's educational and environmental background, this is a difficult categorisation to make. Almost as much difficulty was found in deciding between 'Predominance of stereotypes' and 'Influence of previous knowledge', and between 'Extraneous items' and 'Predominance of stereotypes' for the same reason. As these confusions arose within the one main group of errors, teachers did prove fairly successful in allocating errors to the correct source – the child – which is an important finding.

3.11 SECOND VALIDATION TRIAL

If the category system is to prove a useful tool which busy teachers can use in diagnosis to help to improve pupil comprehension, its use has to be fairly easily

mastered and it must not be too time-consuming. A follow-up workshop trial for 20 learning support teachers was held to assess the practicality of the system.

3.11.1 *ADMINISTRATION*

Teachers were asked to classify errors into four main error groups, child-centred, text-centred, errors resulting from surface reading, and errors arising from the reader's attempt to find meaning of the text. Lists of 20 errors compiled from those produced by pupils from primary IV to secondary 2 were distributed along with notes regarding the circumstances in which they had arisen. Definitions of the four main error groups were explained and given to teachers for reference as they allocated the 10 errors assigned to each in alternate order to the appropriate section. Approximately 15 minutes were given for this error classification task. An expanded list showing the 10 categories linked to the main error groups was also given out so that teachers having become familiar with the four divisions could later become more specific as to error sources.

3.11.2 *RESULTS*

TABLE 3:28

Level of Teacher–Researcher Agreement Over Four Main Categories in Follow–up Validation Trial

Error Type	Level of Agreement		
	Actual	Possible	%
Child–centred errors	39	50	78
Text–centred errors	26	50	52
Errors arising from surface reading	24	50	48
Errors demonstrating 'effort after meaning'	26	50	52
Total	115	200	
Average % agreement	57.5%		

3.11.3 *DISCUSSION*

In this short time, 57.5% agreement was reached by teachers with researcher classification. Working with their own pupils and texts which the readers had actually used in classroom assignments it seems likely that teachers could even more accurately pin–point the probable error source. It was interesting that 78% agreement was reached on child–centred errors. This may have been due to the specific training and working methods of learning support teachers. 'Effort after

meaning' errors were frequently confused with child-centred errors but both categories are related to the reader rather than to the text. Surface reading and text-centred errors were similarly confused to some extent but these two are likewise connected by originating in the printed word. (Full table of results is given in Appendix; Appendix 1, Nos. 23-27).

The value of this classification system which groups children's comprehension errors into categories may not in fact depend entirely on its accuracy because the textual message is not easily quantifiable. Comprehension of text meets with the same problem as is encountered by conversation analysts who realise that meanings are established in a context and do not lie in the words alone. Langford (1981) writes "how an utterance is to be taken is always a matter for negotiation by the participants in the course of a conversation" (p. 38). Similarly the category to which an error is assigned on any occasion may not always be the appropriate one. An example is the word 'park'. For some children, the designation of Mungo Park as a recreation ground might be due to a simple confusion of word meaning. For Perth city pupils such a designation would more likely be due to previous knowledge of the important new McDiarmid Park Football Ground. The allocation of error to category is a matter of negotiation between teacher and child in context of the situation in which it arises. In endeavouring to establish the accuracy of the category system by teacher validation, the same problem is encountered. The main use of the category system may be that it provides a way of looking at children's comprehension difficulties, and an insight into the ways in which their miscomprehensions might arise.

When considered in that light, discrepancies in the categorisation of errors by validating teachers need not be seen as failure of the category system but differences which arise because the explanation of a child's response is context specific. Moreover validators may approach the classification from differing standpoints, emphasising the semantic, syntactic or social aspects of the text. The value of the system may not so much depend on a high level of inter-teacher agreement but lie in its focusing teachers' attention on the range of possible sources of miscomprehension when pupils read text.

Ways in which error source identification might be used with pupils were considered by the learning support teachers and ideas for developing expertise in specific areas put forward. In general discussion, these teachers were in agreement that learning support based on error categorisation seemed a useful method by which to approach the wide subject of comprehension difficulty.

3.12 SUMMARY

As a result of the nine feasibility studies, validation trials and teacher workshop, 10 categories of error which could be usefully identified by teachers were selected for use in the main study. These categories which appear to cover most of the types of miscomprehension pupils aged from 8-11 years produce in their interaction with fictional text will be used to classify the errors made in the written and illustrated protocols of the experimental group.

CHAPTER 4

Main Study:

Design, Hypotheses and Procedures

4.1 DEVELOPMENT FROM FEASIBILITY STUDIES

From the information collected in the course of the feasibility studies, it was possible to draw up a design for the main study to be run with selected experimental groups of subjects. Informed decisions could be made about the type of texts to be used, the modes of presentation to incorporate, and the methods of scoring to be employed. The age range of pupils to be studied, 8–11 years, had been selected for the feasibility studies as that was the range within which problems of comprehension were causing concern to teachers. Geographical location and ability level were also selected as useful variables to incorporate in the main study.

The system of classification of errors into categories which developed from the feasibility studies and had been found to be capable of accommodating most of the errors made by pupils of this age group when studying passages of written text, was selected as a method of categorising material in pupil response protocols for subsequent examination and statistical analysis.

4.2 HYPOTHESES

The hypotheses to be tested in the main study were:

a. That the individuality of texts would affect the distribution and frequency of errors of all categories.

Rationale – The style (Graesser *et al.*, 1980), structure (Kintsch *et al.* 1975; Van Dijk, 1977), cohesion (Halliday & Hasan, 1976) and level of difficulty of text (Taylor, 1953; Gilliland, 1972; Stein and Glenn, 1979, Omanson, 1982) have all been found by researchers to affect the comprehension process and are therefore likely to have an effect on the number and type of error made. Because texts might be expected to present different difficulties, four were used for this study to give a wider sample. The texts were those already described in Feasibility Study 10 – 'Viking Feast', 'Golden Dragon', 'Lost City' and 'Jungle Train'.

b. That the category system would show the effects of different methods of presentation of text on subjects.

Rationale – Methods of presentation of task (Ausubel, 1965; Graesser *et al.*, 1980; Tillema, 1982), types of required response (Lunzer & Gardner, 1979; Mulholland, 1984), withdrawal or retention of text (Danserau *et al.*, 1979) and timing (Meyer, 1975) have all been found to have varying effects on comprehension and recall of prose. The particular method by which response protocols are produced, is likely to affect the type and quantity of errors in the category system. To test this written and illustrated responses were used as they had given rise to different types of error in the feasibility studies.

c. That the distribution and frequency of errors across the category system would be affected by the varying ages of the pupils.

Rationale – Research has suggested that with changes in developmental level (Schallert, 1982; Zabrucky & Ratner, 1985; Zabrucky & Moore, 1989) come changes in perception (Paivio, 1971; Rayner, 1976), memory capacity (Frederiksen, 1975), experience (Siegel, 1983), quantity of recall (Marshall & Glock, 1978; Sanford & Garrod, 1981), and inferential ability of pupils (Graesser, 1981). All of these are related to children's ability to understand text.

d. That the distribution and frequency of errors across the category system would show the effects of varied pupil ability.

Rationale – Pupils' level of reading ability as assessed by a standardised test reflects their ability to apply various reading skills (France, 1979), and is therefore likely to affect the quality and distribution of their comprehension errors. Level of personal intelligence also contributes to reading ability (Bullock, 1975).

e. That the distribution and frequency of errors in the category system would show the effects of varied geographical location of pupils e.g. rural or urban.

Rationale – Socio–economic class has been found to have considerable effect on ability to handle at least some kinds of language and as a result on reading ability (Lawton, 1968; Bernstein, 1971). Interest (Spiro, 1977), attitude and experience (Clay, 1972) similarly play a part in the reading process. It seems likely therefore that environmental differences which might affect interests and experience could affect the type and quantity of pupil comprehension errors.

4.3 SUBJECT SAMPLE

The subjects were 80 pupils equally drawn from rural and urban schools. Twenty pupils in each of the four age groups, 8–11 years, were used for this research.

As a preliminary to the main study 'The Primary Reading Test', Level Two (France, 1979) was administered to pupils in the selected classes. The test was chosen as one which was standardised for use in Scottish schools. This standardised reading test was used to give an objective measure of the ability of pupils in the selected classes to "apply reading skills for the understanding of words and simple sentences in the early stages of learning to read" (France, 1979). The Primary Reading Test is an untimed, multiple choice test which can be

administered in about 30 minutes to a class under normal classroom conditions. The test was used to eliminate pupils showing either high expertise or unusual difficulty in reading, from the target group. The high achievers would be expected to contribute fewest errors for research purposes, while those struggling with basic decoding would be hindered in their construction of meaning from the text. Consequently they would be expected to present 'errors' which derived from inadequate word recognition skills in addition to those arising from failure to understand. Inclusion of such errors would introduce a confounding variable to the results, because they would not be purely due to miscomprehension.

4.4 DESIGN

Eight classes, four in urban i.e. city perimeter, and four in rural schools were used in the study. One class of urban pupils and one of rural, in each age group was tested. Only a few pupils, considerably younger or older than their average class age, did not fall within the standard age score range of the Primary Reading Test. All pupils from four rural and four urban classes were given the reading test. The average class size was 25, giving a total of approximately 200 readers.

From the results of the above test, five pupils with standard age score (France's equivalent to reading quotient) in the 90–99 range and five pupils in the 101–110 range i.e. pupils close to average ability, were chosen from each of the eight classes. Groups were as closely matched as possible in terms of standard age score and sex and the 80 selected pupils ranged in age from 8–11 years. The total target

group was composed of 40 readers of slightly above average reading ability and 40 who were slightly below average. Half of the classes came from rural schools and half from a large urban school. The rural pupils came from schools which had rolls of around 100. There was a total of 20 subjects in each of the four year groups i.e. Primary IV, V, VI, VII, in the Scottish education system. The standardised test was administered to all classes during the month of May under normal classroom conditions.

4.5 METHOD

The activities selected for the study were based on hypothesis (c) and therefore covered different methods of presentation and the effects of retention and withdrawal of text.

4.5.1 *DIRECTED ACTIVITIES*

To make as similar as possible in content and difficulty the writing and drawing tasks, completion tasks were prepared for the memory section of each.

The directed writing activity for each text, consisted of four sentences to be completed by selecting a word or phrase from a list of three provided so that the completed sentence conveyed the meaning expressed in the text. The following is an example 'The dragon's wings were (red, coiled, huge)' (Appendix 1, No. 28).

The comparable cloze-type, drawing task presented for each text consisted of four incomplete line sketches, together with phrases from the passages. Completion of each drawing by illustration of the given phrase, was required of the readers. A sample phrase for illustration was 'creepers had grown out of the walls'. (See Appendix 1, Nos. 29-33 for complete list).

As both the writing and drawing directed activities required the subjects to interpret a phrase from one of the texts and, from memory, supply information for a completion task, the two activities were considered to be similar in demand on the reader's recalled interpretation of the material used.

4.5.2 *NON-DIRECTED ACTIVITIES*

The non-directed writing activities were written summaries of the texts in approximately 40 words. This number was suggested as being one-third of the passage length, and one which would allow for inclusion of main points of the text. A definite number of words was not stipulated as a limit, but around 40 was suggested. The equivalent drawing task was the production of a free drawing of 'The Feast', 'The Train', 'The City' or 'The Dragon'.

4.6 ADMINISTRATION

The tests were administered within six consecutive weeks. All pupils in the eight classes previously tested by the Primary Reading Test carried out the directed and

non-directed activities. Protocols were collected from a total group of approximately 200 pupils so that individuals were unaware of the composition of each target group of subjects, and to generate a quantity of extra material on which to validate scoring procedures.

In each of the eight classes were two working groups, one composed of five subjects with standard age score in the 101-110 range, and the other of subjects in the 90-99 range. Extra pupils in each class were alternately allocated to either group according to the standard age scores previously acquired from the reading test. In this way the working groups did not correspond to ability groups in any of the selected classes, and pupils were unaware that only certain class members were targeted. Each class completed two work sessions, of approximately one hour each, and texts and protocol production methods were counterbalanced across age groups (Table 4:1).

The following procedure was adopted during each testing session. Pupils were allocated to groups A or B, which remained constant on both occasions and a text was distributed to each member. During working sessions, the pairs of texts, 'The Feast' or 'The City' and 'The Dragon' or 'The Train' were used. These combinations were not changed so that the two texts with jungle backgrounds, 'The City' and 'The Train' were never produced in the same session to promote confusion or overlap. Half of the total group, completed the writing tasks before the drawing tasks and vice-versa. Within any one class, all pupils were writing or drawing at the same time, to minimise distraction while the order of writing and

drawing employed in any one class was reversed on the second occasion.

TABLE 4:1

Plan of a Class Testing Session
(Session 1)

	Group 1	Group 2
Distribute texts		
20 mins	Write about 'Feast' text	Write about 'City' text
Withdraw texts		
10 mins	Uncompleted sentences (Feast)	Uncompleted sentences (City)
Exchange texts		
20 mins	Draw picture of 'City'	Draw a picture of 'Feast'
Withdraw texts		
10 mins	Uncompleted drawings (City)	Uncompleted drawings (Feast)
Total 1 hour		

Session 2. As shown in the above diagram, after twenty minutes of each session, the first texts were withdrawn so that the completion tasks could be completed from memory. The texts were re-distributed to the opposite groups after 30 minutes so that the alternative activities could be carried out.

The instructions given verbally to the readers had to be simple enough for the youngest children to understand and were as follows, with the appropriate one being chosen for each occasion.

a. In about 40 words, describe 'The Feast', 'The City', 'The Dragon' or 'The Train' as you imagine it from reading the story. Read the story as many times as you wish.

b. Draw a picture of 'The Feast', 'The City', 'The Dragon' or 'The Train' as you imagine it from reading the story. Read the story as many times as you wish.

c. Underline the word or words which you think would make the sentence mean the same as it did the story.

d. Look at the part of the story under each picture and add the details given, so that the picture is complete.

Work sessions were balanced to achieve an even spread across urban and rural classes, first and second sessions, classes and texts. They were organised so that higher and lower groups had equal numbers of attempts at each passage. These attempts were alternated so that each ability group handled each passage in both first and second testing sessions. Each of the four texts was used within each age group and in both reading and drawing situations.

The experimental group of worksheets was next sorted into sixteen sets.

4.7 ALLOCATION OF TARGET PROTOCOLS TO GROUPS OF WORKSHEETS

For each text, Train, Feast, City and Dragon as they will now be designated, there were 40 response protocols in each of the four presentation modes i.e. free writing and drawing with text retained and directed writing and drawing with text removed.

The total target group of worksheets was 640, and of these, 320 were produced by children in rural schools and 320 by pupils in urban classes. Forty pupils came from each of the two geographical locations, rural and urban, and worksheets were produced by each subject, four during the first session and four during the second. Each of the four class stages PIV, PV, PVI and PVII were represented in both rural and urban conditions and 10 pupils were targeted in each class. Of those ten pupils, five had been assessed as having just above average in standard score 101–110 in the Primary Reading Test and five had been placed in the slightly below average band (90–99).

When the sets of 40 worksheets were sub–divided into class and ability groups, they were coded to show class level, geographical area and ability level e.g. (5U–), (U = urban) – Primary V child from an urban school in the ability group which has a reading quotient of between 90 and 100. A Primary VII reader from a rural

school in the reading group with reading quotient of between 101 and 110 was coded (7R+) (R = rural). This arrangement yielded eight sets of five papers, for each of the 16 possible variations.

Each of the four types of response, free writing, directed writing, free drawing and directed drawing was produced by 16 groups of five pupils. Eight of the groups came from rural schools and eight from urban ones.

4.8 ANALYSIS OF EXPERIMENTAL GROUP WORKSHEETS

The next stage was to scrutinise the worksheets for errors and to list these in such a manner that they could be traced to their positions in each of the protocols. To facilitate the tracing of individual protocols each group of five was further allocated one of the numbers 1–5. The Primary V pupils from a rural school and in the above average reading ability group were, for example, coded as follows (VR+1) (5R+2) (VR+3) (VR+4) (VR+5).

At this stage the errors were not allocated to categories, but after they had been listed, the free writing protocols were examined so that direct quotations from the text, could be listed. The purpose of this was to give an indication of the extent of "copy – delete" (Brown & Day, 1983) strategy practised in the production of summaries.

Omissions, parts of text not referred to in the directed–drawing worksheets, were also listed. Directed drawing mode was chosen because the words and phrases selected for illustration had been amongst those omitted from drawings, produced by the pilot subjects in the feasibility studies. The purpose was to try to discover whether they had been omitted because they were generally considered to be unimportant, or whether they had been avoided because of difficulty. As only a few details were requested in each directed drawing task, their omission would seem to indicate avoidance.

In the sentence completion task, the errors of each subject were listed.

4.9 CATEGORISATION OF ERRORS

The allocation of the collected 'errors' to categories was done by the researcher using the system as validated. In this way results may be liable to subjective error, but as author–teacher agreement had been 65.3% over the four major category groups, this method of allocation was selected as being equal across all the results of the eighty subjects. The full results of the categorisation of errors are given in Appendix 2, and the analyses of results follow in the next chapter.

CHAPTER 5

Results Of Main Study

5.1 METHOD OF ANALYSIS

The results of the main study are firstly examined to show the types of error and their frequency of occurrence in relation to the five main effects of text, age, mode of presentation, ability and location. Thereafter relationships between the main effects are assessed.

For analyses of the data collected in the main study the null hypothesis was that there is no significant effect of any of the variables of text, age, mode of presentation, ability and location on the number of errors assigned to the categories defined in the previous chapter i.e. that the variables do not have any significant effect on the types of errors made by the subjects.

Chi-square values were worked out for the errors recorded in each of the 10 categories under each of the five main effects.

5.2 STATISTICAL TESTING

Chi-square was used as the statistical test in these analyses, because it is a method of evaluating statistically the difference between expected and observed frequencies and was therefore a suitable test by which to analyse the incidence of errors in each category. The chi-square for each error category for each of the five main effects, was calculated to discover if there was a significant difference between the frequency of errors assigned to the category related to the variable involved. For

example, when the variable was readability level of text there was no significant difference between the frequency with which subjects recorded errors in the Extraneous items category in texts of different readability levels, as measured by Fog and Fry Readability Formulae. There was a significant difference associated with the readability level of the text for errors recorded in category 5, 'Discrimination errors', and it was in the expected direction i.e. the largest frequency of 'Discrimination errors' was found in the worksheets relating to the most difficult text (Dragon) and the fewest in the worksheets relating to the easiest text (Train).

In the tables which follow, values of chi-square are given for all categories of error but tables showing frequencies have been restricted to those categories which show a significant difference in frequency.

5.3 MAIN EFFECTS

5.3.1 *INDIVIDUAL TEXTS*

TABLE 5:1

Value of χ^2 Between Frequencies of Error on Four Different Texts

No.	Category of Error	χ^2	p
1.	Extraneous items	8.77	NS
2.	Predominance of stereotypes	19.36	p<0.001
3.	Influence of previous knowledge	150.48	p<0.001
4.	Confusion of word meanings	51.57	p<0.001
5.	Discrimination errors	17.46	p<0.001
6.	Disregard of stated facts	81.41	p<0.001
7.	Literal interpretation	15.43	p<0.01
8.	Reproduction	11.15	NS
9.	Justification	0.70	NS
10.	Transposition	21.36	p<0.001

From the results, only three categories were not affected by the actual texts used, while six categories reached $p<0.001$ level of significance.

TABLE 5:2

Frequency of Error by Category According to Text

Text	Readability Level	Frequency of Each Category 2	3	4	5	6	7	8	10	Total
Train	7.6 y	11	25	0	0	144	3	3	4	187
		(5.0)	(11.5)	(0)	(0)	(66.0)	(1.4)	(1.4)	(1.8)	
Feast	8.1 y	1	112	6	2	71	6	10	18	216
		(0.4)	(43.2)	(2.6)	(0.8)	(27.4)	(2.3)	(3.9)	(6.9)	
City	12.5 y	8	15	5	16	168	2	13	39	253
		(2.5)	(4.6)	(1.5)	(4.9)	(51.9)	(6.5)	(3.9)	(12.0)	
Dragon	13 y	19	51	29	10	104	5	24	16	234
		(7.0)	(19.0)	(10.8)	(3.7)	(38.8)	(1.9)	(7.4)	(6.0)	

Complete results are in Appendix 2, Table 1.

Figures in brackets indicate percentage of total errors. Categories 1 and 9 contained so few errors as to make comparison pointless.

The City text showed considerably more examples of stereotype errors. This may be because all subjects live in or within 10 miles of the city and have definite views on what a city is like. By far the greatest number of errors arising from previous knowledge, occurred in the Feast text as pupils tended to apply their own personal knowledge of celebration meals, to the situation, rather than extract the

information about a completely different type of feast described in the text. The Dragon text where such personal knowledge could not be called upon, showed least effect in this category.

The City and Dragon texts gave rise to most errors involving the decoding and meaning of words possibly because they had vocabulary which was less familiar to the readers. The reading level of those two passages was considerably higher than that of the other two. There was more 'Disregard of stated facts' in the 'Train' and Dragon texts. These arose when key words were extracted and elaborated. The Dragon text which called more for imagination and less for previous knowledge, gave rise to most errors in the 'Literal information' category and contained more 'Transposition' errors.

Although choice of text can have large individual effects on certain categories, possibly because of personal knowledge and interests of readers, all of these texts gave rise to five or more categories of error out of the 10 selected categories, but in significantly differing frequencies.

5.3.2 *AGE*

TABLE 5:3

Values of χ^2 Between Frequencies of Error Occurring in Different Age Groups

No.	Category of Error	χ^2	p
1.	Extraneous items	2.24	NS
2.	Predominance of stereotypes	3.55	NS
3.	Influence of previous knowledge	3.55	NS
4.	Confusion of word meanings	0.34	NS
5.	Discrimination errors	1.57	NS
6.	Disregard of stated facts	13.69	p<0.01
7.	Literal interpretation	4.66	NS
8.	Reproduction	1.68	NS
9.	Justification	0.60	NS
10.	Transposition	21.36	p<0.001

Only two categories show a significant effect of age. They are 'Disregard of stated facts' and 'Justification'. Complete results are given in Appendix 2, Table 2.

TABLE 5:4

Frequencies of Categories of Error According to Age

No.	Category of Error	PIV	PV	PVI	PVII	Total
6.	Disregard of stated facts	130 (40.0)	136 (54.1)	119 (48.0)	102 (41.6)	487 (45.6)
9.	Justification	16 (4.9)	2 (0.8)	2 (0.8)	1 (0.4)	21 (2.0)

Figures in brackets indicate percentage.

In the two categories where a level of significance is reached, 'Disregard of stated facts' and 'Justification' results show that younger children make more errors than older ones. It is especially noticeable that only the Primary IV subjects, approximately eight years old, make many errors in the 'Justification' category.

Apart from these two categories, the general lack of significance would indicate that pupils are making the same type of error at age eleven as they are making at age eight, and to almost the same extent. This finding has serious implications for the teaching of reading in the primary school.

5.3.3 *MODE OF PRESENTATION*

TABLE 5:5

Values of χ^2 Between Frequencies of Error Occurring in Different Presentation Modes

No.	Category of Error	Writing	Drawing	Total	χ^2	p
1.	Extraneous items	48 (11.8)	41 (6.2)	89 (8.3)	9.51	p<0.01
2.	Predominance of stereotypes	7 (1.7)	32 (4.8)	39 (3.6)	6.15	NS
3.	Influence of previous knowledge	48 (11.8)	155 (23.5)	203 (19.0)	21.664	p<0.001
4.	Confusion of word meanings	10 (2.5)	30 (4.5)	40 (3.7)	2.50	NS
5.	Discrimination errors	28 (6.9)	0 (0)	28 (2.6)	43.93	p<0.001
6.	Disregard of stated facts	92 (22.5)	395 (59.7)	487 (45.5)	139.33	p<0.001
7.	Literal interpretation	30 (7.4)	5 (0.7)	35 (3.3)	32.61	p<0.001
8.	Reproduction	50 (12.3)	0 (0)	50 (4.7)	82.25	p<0.001
9.	Justification	21 (5.2)	0 (0)	21 (2.0)	32.08	p<0.001
10.	Transposition	74 (18.1)	3 (0.5)	77 (7.2)	115.39	p<0.001
	Total	408 (38.2)	661 (61.8)	1069		

Figures in brackets indicate percentage of total errors.

Because of the small numbers recorded in some categories, results were analysed in writing and drawing modes of presentation. Full results for four presentation modes are recorded in Appendix 2, Table 3. The mode of presentation had a significant effect on eight of the 10 categories. The largest effect was shown in the 'Disregard of stated facts' where the drawing mode gave rise to over four times the number of errors recorded in the writing mode. This suggests that in the production of written answers, pupils have found a technique of producing plausible answers which may disguise real errors of comprehension. This suggestion is further supported by the high number of errors listed in the writing mode of the 'Reproduction' category.

The errors which appeared in the drawings and fell into the 'Disregard of Stated Facts' category appeared to arise because the pupils latched on to keywords and ideas and therefore to disregard the printed word. In a way this was 'Reproduction' too, but only of selected fragments. The relationships between them, if understood, were frequently ignored.

Since no illustration was presented to the subjects it could not be reproduced, whereas the text could be quoted verbatim. Only the errors made in transcription betrayed the fact that some pupils did not understand what they were writing. It was possible that others also did not understand completely but had better mastery of the reproduction technique.

Teachers, if unaware of this situation, may allow pupils to progress to more difficult material when they should have more practice with texts at a level at which they can comprehend. In this way initial problems with comprehension of text are multiplied. The normal 'question and answer' or 'multiple choice' methods frequently used in classrooms, may fail to indicate the true extent of understanding. It is an important finding that the mode in which comprehension is displayed affects the types of misunderstandings.

5.3.4 *ABILITY*

TABLE 5:6

Values of χ^2 Between Frequencies of Error Occurring in Different Ability Levels

No.	Category of Error	χ^2	p
1.	Extraneous items	5.96	NS
2.	Predominance of stereotypes	0.001	NS
3.	Influence of previous knowledge	5.79	NS
4.	Confusion of word meanings	0.18	NS
5.	Discrimination errors	1.13	NS
6.	Disregard of stated facts	0.02	NS
7.	Literal interpretation	0.59	NS
8.	Reproduction	0.74	NS
9.	Justification	1.51	NS
10.	Transposition	0.99	NS

Ability had no significant effect on frequency of occurrence of any category of error. Although the two ability groups selected for the study did not include the least or most competent readers, the groups did range from standard age score of

90–110 as recorded on the Primary Reading Test (France, 1979). It might have been expected that as the low ability group ranged from standard age score 90–99 and the high ability group from 101–110, that the values of chi–square would have been higher than they were. That they were not may have been because the gap between the groups was too narrow. The findings suggest that pupils handle the same texts in approximately the same way regardless of their ability to read as defined by results of standardised tests. Such tests are the usual method of assessing reading ability in the classroom when a norm–referenced assessment is desired, but the Primary Reading Test did not use connected prose. It presented unconnected sentences to the pupils, as do the majority of such tests for primary children.

It may be either that pupils' ability to handle text is different from that required to handle sentences, or that the higher ability group are not realising their potential. Although the philosophy of learning support is that any pupil who needs it gets help, limited available time tends to result in pupils at extremes of the ability range actually receiving it. Those who are neither seriously lagging nor obviously requiring supplementary extension material, may not get the support which could enable them to make better progress. This minimal difference between the groups has important implications for classroom practice. Full results of error totals according to ability are given in Appendix 2, Table 4.

5.3.5 *LOCATION*

TABLE 5:7

Values of χ^2 Between Frequencies of Error Occurring in Different Locations

No.	Category of Error	χ^2	p
1.	Extraneous items	2.62	NS
2.	Predominance of stereotypes	0.07	NS
3.	Influence of previous knowledge	7.19	p<0.01
4.	Confusion of word meanings	2.91	NS
5.	Discrimination errors	0.40	NS
6.	Disregard of stated facts	3.78	NS
7.	Literal interpretation	0.51	NS
8.	Reproduction	0.75	NS
9.	Justification	1.36	NS
10.	Transposition	0.15	NS

There was a significant effect of location on only one error category – 'Influence of previous knowledge'.

This may be because the rural subjects all lived within 10 miles of the city and were therefore fairly familiar with the two settings. The pupils in the urban sample all attended the same fairly large primary school and in terms of environmental knowledge, would share the same setting, but in attending four rural primary schools only a short distance from the town, the environmental knowledge of the rural pupils would not be substantially different. Full results are given in Appendix 2, Table 5.

5.4 SUMMARY OF MAIN EFFECTS

The main criteria used by class teachers in selecting materials and methods for use by their pupils are age and ability. Age determines the year group and class in which children are placed, and ability is the measure used to decide the particular class group in which each child will operate. The finding of this study is that these attributes had little or no effect.

Age showed a significant effect on only two categories – 'Disregard of stated facts' and 'Reproduction' while ability showed no significant effect on any category.

Location, which like age and ability is personal to each reader, likewise had significant effect on only one category – 'Influence of previous knowledge'.

The two variables which are under teacher control, text and mode of presentation, did have significant effects on the number and type of errors made. Texts had

significant effects on all but three categories – (1) 'Extraneous items', (8) 'Reproduction', and (9) 'Justification'.

Mode of presentation had significant effects on all but two categories – (2) 'Predominance of stereotypes', and (4) 'Confusion of word meanings'.

As well as the main effects of text, age, mode of presentation, ability and location, on the categories of errors, certain relationships and trends were apparent among these factors and the error totals listed in the 10 selected categories of classification. These will now be discussed.

5.5 VARIATIONS AND INTERACTIONS

5.5.1 *INTERACTION BETWEEN AGE AND ABILITY*

TABLE 5:8

Variation in Effect of Age According to Ability

		Below Average		Above Average	
No.	Category of Error	χ^2	p	χ^2	p
1.	Extraneous items	6.63	NS	1.13	NS
2.	Predominance of stereotypes	1.32	NS	5.43	NS
3.	Influence of previous knowledge	9.03	NS	2.45	NS
4.	Confusion of word meanings	3.44	NS	4.60	NS
5.	Discrimination errors	2.56	NS	1.83	NS
6.	Disregard of stated facts	26.03	P<0.001	4.08	NS
7.	Literal interpretation	2.53	NS	4.99	NS
8.	Reproduction	6.46	NS	6.43	NS
9.	Justification	31.34	P<0.001	6.20	NS
10.	Transposition	1.04	NS	1.59	NS

Full results are given in Appendix 2, Table 6.

Only two categories, 'Disregard of stated facts' and 'Justification', show significant effects across the four primary stages and the effect only occurs in the results of the below average group. The effect on the 'Justification' category appears because of the much greater use of it by the youngest group who appeared to have to give reasons for their productions.

TABLE 5:9

Categories of Error Showing Effect of Age in Below Average Group
Frequency of Occurrence of Errors for Each Class

No.	Category of Error	PIV	PV	PVI	PVII	Total	χ^2	p
6.	Disregard of stated facts	64 (34.8)	101 (61.6)	60 (44.8)	59 (45.8)	284 (45.4)	26.03	p<0.001
9.	Justification	16 (8.7)	0 (0)	1 (0.7)	1 (0.7)	18 (2.9)	31.34	p<0.001

Figures in brackets indicate percentage of total errors indicate.

All classes made errors in 'Disregard of stated facts' but a much greater percentage were produced by Primary V. As the same percentage was not produced by the above average ability group at the same stage, it may not be an effect of age but of ability or confidence. The same applies to the 'Justification' effect which was not found in PIV in the results of the above average group, and so would likewise

probably be an effect of ability or confidence. Full results are given in Appendix 2, Table 7.

5.5.2 *INTERACTION BETWEEN AGE AND MODE OF PRESENTATION*

In the main effects analysis of mode of presentation and categories, eight out of 10 categories showed significant differences. When analysed separately the free drawing, directed drawing and free writing modes showed no significant interaction between age and mode of presentation. Only the directed writing mode showed a significant relationship and that only affected one category – 'Justification' – where the youngest age group made the only errors. As each age group was composed of two samples from different schools, this score was not produced by a single, out–of–line class. The youngest readers seemed to justify their statements, perhaps because they could bring less previous knowledge and experience to the task and felt less secure in their answers.

TABLE 5:10

Categories of Error Showing Variation in Directed Writing According to Age

No.	Category of Error	PIV	PV	PVI	PVII	Total	χ^2	p
9.	Justification	7 (9.6)	0 (0)	0 (0)	0 (0)	7 (3.7)	11.65	p<0.01

Figures in brackets indicate percentage of total errors. Full results are given in

Appendix 2, Table 8.

The directed drawing mode was the only mode of presentation to show a definite if slight developmental trend.

TABLE 5:11

Total Number of Errors in Directed Drawing Mode
Frequency of Occurrence of Errors for Each Class

	PIV	PV	PVI	PVII	Total
Total	74 (29.0)	64 (25.0)	61 (23.9)	57 (22.3)	256

Figures in brackets indicate percentage of total errors. Full results are given in Appendix 2, Table 9.

Certain categories of error were not relevant to some modes of presentation as errors could not be made e.g. 'Reproduction' in directed writing and 'Discrimination errors' in drawing. When the results of the four age groups in the free writing mode were compared on chi-square results there were no significant effects indicating that across the age span of four years there was no great change in the way that the same four texts were handled when pupils freely wrote about the content of the passages. It would be expected that PVII would make fewer total

errors in each category than PIV when handling the same texts but that was not always so and no regular developmental effect could be determined.

TABLE 5:12

Number of Errors of Each Age Group in Each Presentation Mode

	Free Writing	Directed Writing	Free Drawing	Directed Drawing
PIV	78	73	103	74
PV	41	36	110	64
PVI	48	37	102	61
PVII	54	44	90	57
Total	218	190	405	256

Within each presentation mode there was no systematic age effect. Although the overall effect of presentation mode on the category system was considerable, it did not interact with the effect of the varying ages of the subjects taking part. Full results are given in Appendix 2, Tables 10–11 and 23.

5.5.3 *INTERACTION BETWEEN AGE AND TEXT*

When the texts were analysed individually in relation to the age range, there was only one category, 'Justification', which demonstrated a significant relationship and that only occurred in the results of one text – Dragon – which was rated most difficult in terms of reading level (13.1 y – Fog Index). The errors in the 'Justification' category occurred only in the youngest two reading groups and

appears to be age–related rather than text–related. These results suggest that no matter whether the reading level of the text is low (Train – 7.61 y) or high (Dragon – 13.1 y) pupils over a four year range from those who have not long since learned to decode, to those about to move into Secondary School, make similar types and quantities of error when comprehending text. This is an important finding for classroom practice.

TABLE 5:13

Category of Error Showing Effect of Age on Dragon Text
Frequency of Occurrence of Errors for Each Class

No.	Category of Error	PIV	PV	PVI	PVII	Total	χ^2	p
9.	Justification	7	1	0	0	8	16.57	p<0.001
		(8.3)	(1.3)	(0)	(0)	(2.5)		

Figures in brackets indicate percentage of total errors. Full results are given in Appendix 2, Table 12.

The 'Justification' category in the Dragon text does show a developmental trend between PIV and PV although this does not hold true for all texts as the following table of error frequencies (Table 5:14) shows.

TABLE 5:14

Frequencies of Error Showing Effects of Age on Text Totals
Frequency of Errors for Each Class

Text	PIV	PV	PVI	PVII	Total
Train	80 (36.7)	53 (24.3)	50 (22.9)	35 (16.0)	218
Feast	74 (28.6)	70 (27.0)	56 (21.6)	59 (22.8)	259
Dragon	84 (25.9)	76 (23.5)	76 (23.2)	88 (27.2)	324
City	87 (32.5)	52 (19.4)	66 (24.6)	63 (23.5)	268
Total	325 (30.4)	251 (23.5)	248 (23.2)	245 (22.9)	1069

Figures in brackets indicate percentage of total errors. Full results are given in Appendix 2, Tables 12–15 and 31.

When the total errors for each text are compared, only the Train text, rated to be the easiest, shows a reliable developmental effect, although for every text, PIV, the youngest group, made the most errors. When the four text totals are added together a very slight developmental effect appears, with only the youngest group of subjects having an appreciably greater number of total errors and a higher percentage of total errors. There is little difference in either total errors or percentage of error totals across the other three year groups.

5.5.4 *INTERACTION BETWEEN AGE AND LOCATION*

When the results of the urban group were analysed in age groups, there was one significant effect on the 'Extraneous items' error category but in the same calculations for the rural group, two categories reached significance level. These were 'Disregard of stated facts' and 'Justification'. In both cases there was considerable difference between the scores of the two lower age groups and the two higher ones. The totals for urban and rural did not vary greatly in 'Disregard of stated facts' (urban – 242; rural – 245) and 'Justification' (urban – 10; rural – 13), but the spread of errors over classes was different. It would seem that the developmental trend mentioned above may have begun slightly earlier with rural pupils. Addition of errors over 10 categories suggests this.

TABLE 5:15

Frequency of Errors of Rural and Urban Groups

	Total Errors Over 10 Categories				
	PIV	PV	PVI	PVII	Total
Rural subjects	135	119	121	127	502
Urban subjects	190	132	127	118	567

TABLE 5:16

Effects of Age – Urban Group

No.	Category of Error	PIV	PV	PVI	PVII	Total	χ^2	p
1.	Extraneous items	29 (15.3)	6 (4.5)	11 (8.7)	9 (7.6)	55 (9.7)	11.45	p<0.01

Figures in brackets indicate percentage of total errors.

TABLE 5:17

Effects of Age – Rural Group

No.	Category of Error	PIV	PV	PVI	PVII	Total	χ^2	p
6.	Disregard of stated facts	65 (48.1)	76 (63.9)	58 (47.9)	46 (36.2)	245	18.91	p<0.001
9.	Justification	11 (8.1)	0 (0)	2 (2)	0 (0)	13	23.50	p<0.001

Figures in brackets indicate percentage of total errors. Full results are given in Appendix 2, Tables 16–17.

The relationship between ability and age has already been discussed. The other factors which appear to interact with ability are text, presentation and location.

5.5.5 *INTERACTION BETWEEN TEXT AND ABILITY*

A significant effect of text was found in four categories of error in the above average group and in seven categories in the below average group. 'Literal information', 'Reproduction' and 'Justification' were the three categories which did not reach significance level in either ability group.

TABLE 5:18

Categories of Error Showing Effects of Text on Above Average Group

No.	Category of Error	Train	Feast	Dragon	City	Total	χ^2	p
3.	Influence of previous knowledge	6 (7.1)	60 (60.6)	9 (5.9)	26 (23.2)	101 (22.5)	18.35	p<0.001
4.	Confusion of word meaning	0 (0)	3 (3.0)	0 (0)	12 (10.7)	15 (3.3)	27.11	p<0.001
6.	Disregard of stated facts	68 (80.0)	22 (22.2)	78 (51.0)	35 (31.3)	203 (45.2)	73.52	p<0.001
10.	Transposition	1 (1.2)	2 (2.0)	20 (13.1)	12 (10.7)	35 (7.8)	17.03	p<0.001

Figures in brackets indicate percentage of total errors. Full results are given in Appendix 2, Table 18.

The extremely high value of chi-square found in 'Influence of previous knowledge', suggests that pupils in the higher ability group draw to a greater extent on their previous knowledge using it incorrectly more frequently on the Feast and

City texts. The actual error totals over the four texts hardly differed between the ability groups in this category, 101/102 with the below average group making one more, with less variation over texts.

TABLE 5:19

Categories of Error Showing Effects of Text on Below Average Group

No.	Category of Error	Train	Feast	Dragon	City	Total	χ^2	p
1.	Extraneous items	20 (15.0)	24 (15.0)	9 (5.3)	10 (6.4)	63 (10.2)	14.47	p<0.01
2.	Predominance of stereotypes	7 (5.3)	0 (0)	4 (2.3)	11 (7.1)	22 (3.5)	13.35	p<0.01
3.	Influence of previous knowledge	19 (14.3)	52 (32.5)	6 (3.5)	25 (16.0)	102 (16.5)	51.30	p<0.001
4.	Confusion of word meaning	0 (0)	3 (1.9)	5 (2.9)	17 (10.9)	25 (4.0)	27.06	p<0.001
5.	Discrimination errors	0 (0)	1 (0.6)	6 (3.5)	22 (14.1)	29 (4.8)	44.02	p<0.001
6.	Disregard of stated facts	76 (57.1)	49 (30.6)	90 (52.6)	54 (34.6)	269 (43.4)	31.70	p<0.001
10.	Transposition	3 (2.3)	14 (8.8)	19 (11.1)	4 (2.6)	40 (6.5)	15.34	p<0.01

Figures in brackets indicate percentage of total errors and whole numbers indicate actual number of occurrences of error. Full results are given in Appendix 2, Table 19.

In the four other categories significant for both groups the chi-square calculation always gives a higher result for the above average group showing that individual

texts have more specific effects on the more able pupils producing greater variation across the sample of texts. The two categories which are significantly affected by text for the lower ability group only, 'Extraneous items' and 'Predominance of stereotypes', show individual effects. In the 'Extraneous items' category the two easiest texts by reading level have produced more than double the errors found in the other two texts, but errors in 'Predominance of stereotypes' category are not related to textual difficulty.

5.5.6 *INTERACTION BETWEEN MODE OF PRESENTATION AND ABILITY*

When the interaction between the ability of the subjects and the way in which they were asked to use the texts was examined 'Mode of presentation' was found to be an important factor in both sets of ability-group results.

Seven error categories had chi-squares above the $p<0.001$ level of significance in both above and below average group results, while the 'Justification' and 'Extraneous items' categories reached the same level for the below average group. The 'Justification' category was also significant for the higher group but at a lower level, $p<0.01$. The only category which was not significant for either group was 'Predominance of stereotypes'. The less able subjects have used more 'Justification' to support their free writing. This may be because of immaturity or lack of confidence in producing class assignments. The other category of error which appeared in the lower group protocols to a much greater extent than those of the

more able pupils was the 'Influence of previous knowledge'. The less able pupils did not handle so successfully the facts which they called to mind in the effort to understand the text. This was particularly apparent in their drawings. In some of the other categories the high level of significance was the result of the irrelevance of certain categories to specific modes of presentation. For example 'Reproduction' or 'Discrimination errors' were less likely to occur in illustrated protocols than in written ones. These effects were related only to certain individual categories according to mode of presentation and did not affect other error category totals in Table 5:20.

TABLE 5:20

Effects of Mode of Presentation on Above Average Ability Group

No.	Category of Error	Free Writing	Directed Writing	Free Drawing	Directed Drawing	Total	χ^2	p
1.	Extraneous items	16 (18.4)	0 (0)	9 (4.9)	0 (0)	25 (5.1)	44.07	p<0.001
4.	Confusion of word meaning	3 (3.4)	1 (1.3)	0 (0)	16 (11.0)	20 (4.0)	27.60	p<0.001
5.	Discrimination errors	4 (4.6)	11 (14.1)	0 (0)	0 (0)	15 (3.0)	43.47	p<0.001
6.	Disregard of stated facts	16 (18.4)	23 (29.5)	122 (66.3)	85 (58.6)	246 (49.8)	71.70	p<0.001
7.	Literal information	2 (2.3)	8 (10.3)	0 (0)	3 (2.1)	13 (2.6)	22.99	p<0.001
8.	Reproduction	20 (23.0)	0 (0)	0 (0)	0 (0)	20 (4.0)	97.51	p<0.001
9.	Justification	3 (3.4)	0 (0)	0 (0)	0 (0)	3 (0.6)	14.12	p<0.01
10.	Transposition	13 (14.9)	21 (26.9)	0 (0)	0 (0)	34 (6.9)	82.02	p<0.001

Figures in brackets indicate percentage of total errors. Full results are given in Appendix 2, Table 20.

TABLE 5:21

Effects of Mode of Presentation on Below Average Ability Groups

No.	Category of Error	Free Writing	Directed Writing	Free Drawing	Directed Drawing	Total	χ^2	p
1.	Extraneous items	30 (22.9)	2 (1.8)	31 (14.0)	0 (0.9)	64 (11.1)	41.85	p<0.001
3.	Influence of previous knowledge	12 (9.2)	14 (12.5)	37 (16.7)	38 (34.2)	101 (17.6)	29.78	p<0.001
4.	Confusion of word meaning	2 (1.5)	4 (3.6)	3 (1.6)	11 (9.9)	20 (3.5)	18.13	p<0.005
5.	Discrimination errors	3 (2.3)	10 (8.9)	0 (0)	0 (0)	13 (2.3)	30.21	p<0.006
6.	Disregard of stated facts	15 (11.5)	38 (33.9)	135 (61.1)	53 (47.7)	241 (41.9)	87.79	p<0.001
7.	Literal information	9 (6.8)	11 (9.8)	0 (0)	2 (1.8)	22 (3.8)	24.27	p<0.001
8.	Reproduction	30 (22.9)	0 (0)	0 (0)	0 (0)	30 (5.2)	97.51	p<0.009
9.	Justification	11 (8.4)	7 (6.3)	0 (0)	0 (0)	18 (3.1)	26.13	p<0.001
10.	Transposition	14 (10.7)	26 (23.2)	0 (0)	3 (2.7)	43 (7.5)	63.55	p<0.001

Figures in brackets indicate percentage of total errors. Full results are given in Appendix 2, Table 21.

5.5.7 *INTERACTION BETWEEN LOCATION AND ABILITY*

When the errors of the two ability groups were analysed according to location, only three categories of error showed significant interaction effects. They were

'Disregard of stated facts' which was significant at $p<0.001$ level, and 'Reproduction' and 'Justification' which both reached the $p<0.01$ level of significance. In the 'Disregard of stated facts' category, the above average rural group made almost twice as many errors as the corresponding urban group although the general trend showed that the urban pupils made more errors than the rural ones, across the categories. Conversely in the below average group, the urban pupils made 10% more errors in the 'Disregard of stated facts' category than their rural counterparts. In both the 'Reproduction' and 'Justification' categories, the above average rural group made fewer errors than their urban counterparts but the below average group did exactly the opposite.

TABLE 5:22

Effects of Location on Ability

No.	Category of Error	Above Average Rural	Below Average Rural	Above Average Urban	Below Average Urban	Total	χ^2	p
6.	Disregard of stated facts	131 (60.0)	114 (40.3)	72 (31.3)	170 (50.4)	487 (45.5)	43.21	p<0.001
8.	Reproduction	2 (0.9)	18 (6.4)	18 (7.8)	12 (3.6)	50 (4.7)	14.81	p<0.01
9.	Justification	1 (0.5)	12 (4.)	2 (0.9)	6 (1.8)	21 (2.0)	11.68	p<0.01

Figures in brackets indicate percentage of total errors. Full results are given in Appendix 2, Table 22.

5.5.8 *INTERACTION BETWEEN MODE OF PRESENTATION AND TEXT*

After age and ability of pupils have been considered by the teacher, in grouping the pupils in a class, the next factor to be considered when assigning work is the material to be studied. The relationships between text and age, and text and ability have already been discussed, so the other factors which might in this study, interact with text, are mode of presentation and location.

The four texts were analysed individually in relationship to the four presentation modes. Every category showed a significant effect of mode of presentation in the City text.

TABLE 5:23

Effects of Mode of Presentation on City Text

No.	Category of Error	Free Writing	Directed Writing	Free Drawing	Directed Drawing	Total	χ^2	p
1.	Extraneous items	3 (5.7)	0 (0)	13 (13.8)	0 (0)	164 (6)	18.04	p<0.001
2.	Predominance of stereotypes	2 (3.8)	0 (0)	17 (18.1)	0 (0)	19 (7.1)	27.37	p<0.001
3.	Influence of previous knowledge	5 (9.4)	21 (63.6)	14 (14.9)	11 (12.5)	51 (19.0)	49.26	p<0.001
4.	Confusion of word meaning	4 (7.5)	1 (3.0)	3 (3.2)	21 (23.9)	29 (10.8)	23.85	p<0.001
5.	Discrimination errors	3 (5.7)	7 (21.2)	0 (0)	0 (0)	10 (3.7)	35.68	p<0.001
6.	Disregard of stated facts	5 (9.4)	0 (0)	47 (50.0)	52 (59.1)	104 (38.8)	60.39	p<0.001
7.	Literal information	4 (7.5)	0 (0)	0 (0)	1 (1.1)	5 (1.9)	12.01	p<0.018
8.	Reproduction	13 (24.5)	0 (0)	0 (0)	0 (0)	13 (4.9)	55.42	p<0.001
9.	Justification	5 (9.4)	0 (0)	0 (0)	0 (0)	5 (1.9)	20.67	p<0.001
10.	Transposition	9 (17.0)	4 (12.1)	0 (0)	3 (3.4)	16 (6.0)	20.67	p<0.001

Figures in brackets indicate percentage of total errors. Full results are given in Appendix 2, Table 23.

The chi-squares for the City text analysis were high and scrutiny of the errors recorded in the 10 categories across the presentation modes, show large variations in the totals of errors recorded. Some categories were not relevant to certain modes e.g. reproduction was only relevant to the free writing mode of presentation.

These categories where errors were not recorded, contributed in a considerable degree to the overall variation in the totals and therefore to the chi-square results and apply also to the other three texts' results.

In the other three texts, 'Predominance of stereotypes' did not reach significance level and in the Dragon text results, 'Confusion of word meaning' was the only other category where a significant effect was not recorded. The most noticeable total was that recorded in the free drawing mode in the 'Disregard of stated facts' category. There, 120 errors were found although the free writing in that category displayed only six. Directed writing gave rise to no errors in this category whereas directed drawing produced 42.

This is a striking example of pupils' ability to produce written answers which appear to show that they have good understanding of even the most difficult of the texts while the drawing errors indicate that they may know less about its meaning. The finding is indicative of the problem originally noted by teachers and the reason for this research – namely that although pupils appear to read fluently, they often seem to have little appropriate understanding of what they read.

TABLE 5:24

Effects of Mode of Presentation on Dragon Text

No.	Category of Error	Free Writing	Directed Writing	Free Drawing	Directed Drawing	Total	χ^2	p
1.	Extraneous items	14 (23.0)	0 (0)	6 (4.4)	0 (0)	20 (6.2)	38.73	p<0.001
3.	Influence of previous knowledge	2 (3.3)	0 (0)	3 (2.2)	10 (17.9)	15 (4.6)	27.70	p<0.001
5.	Discrimination errors	2 (3.3)	14 (19.7)	0 (0)	0 (0)	16 (4.9)	43.37	p<0.001
6.	Disregard of stated facts	6 (9.8)	0 (0)	120 (88.2)	42 (75.0)	168 (51.9)	203.73	p<0.001
7.	Literal information	3 (4.9)	18 (25.4)	0 (0)	0 (0)	21 (6.5)	55.26	p<0.001
8.	Reproduction	24 (39.3)	0 (0)	0 (0)	0 (0)	24 (7.4)	111.75	p<0.001
9.	Justification	1 (1.6)	7 (9.9)	0 (0)	0 (0)	8 (2.5)	21.14	p<0.001
10.	Transposition	8 (13.1)	31 (43.7)	0 (0)	0 (0)	39 (12.0)	93.40	p<0.001

Figures in brackets indicate percentage of total errors. Full results are given in Appendix 2, Table 24.

Three categories, 'Predominance of stereotypes', 'Discrimination errors', and 'Literal information' did not show a significant effect on the Feast text. Of the other categories, 'Influence of previous knowledge' category produced by far the most errors, and these were mostly in the drawing modes. It would seem from examinations of the results that the subjects' knowledge of food and celebrations influenced their illustrations far more than the text did. They all knew about

eating but when using the Dragon text they have to use their imagination if they failed to get the meaning from the printed word.

TABLE 5:25

Effects of Mode of Presentation on Feast Text

No.	Category of Error	Free Writing	Directed Writing	Free Drawing	Directed Drawing	Total	χ^2	p
1.	Extraneous items	14 (23.7)	0 (0)	16 (13.7)	1 (1.4)	29 (11.2)	21.68	p<0.001
3.	Influence of previous knowledge	4 (8.9)	6 (21.4)	54 (46.1)	48 (69.6)	112 (43.2)	46.95	p<0.001
4.	Confusion of word meaning	0 (0)	3 (10.7)	0 (0)	3 (4.3)	6 (2.3)	13.83	p<0.01
6.	Disregard of stated facts	5 (11.1)	6 (21.4)	47 (40.2)	13 (18.8)	71 (27.4)	18.63	p<0.001
8.	Reproduction	10 (22.2)	0 (0)	0 (0)	0 (0)	10 (3.9)	49.47	p<0.001
9.	Justification	4 (8.9)	0 (0)	0 (0)	0 (0)	4 (1.5)	21.14	p<0.001
10.	Transposition	6 (13.3)	12 (42.9)	0 (0)	0 (0)	18 (6.9)	72.55	p<0.001

Figures in brackets indicate percentage of total errors. Full results are given in Appendix 2, Table 25.

The Train text, which was rated the easiest showed a significant effect of mode of presentation on only two categories, 'Extraneous items' and 'Disregard of stated facts'. With this text the subjects also disregarded much of the textual information but the previous knowledge which they brought to bear conflicted less with the

passage detail than that drawn upon when using the three other texts. Many failed to realise that the City and the Feast described were completely different from those with which they were familiar.

TABLE 5:26

Effects of Mode of Presentation on Train Text

No.	Category of Error	Free Writing	Directed Writing	Free Drawing	Directed Drawing	Total	χ^2	p
1.	Extraneous items	17 (28.8)	2 (3.4)	5 (8.6)	0 (0)	24 (11.0)	28.13	p<0.001
6.	Disregard of stated facts	16 (25.4)	556 (94.8)	43 (74.1)	31 (72.1)	144 (66.1)	21.44	p<0.001

Figures in brackets indicate percentage of total errors. Full results are given in Appendix 2, Table 26.

There appears to be a correlation between textual difficulty and the effects of presentation mode with fluctuations in the pattern occurring perhaps because of concrete or imaginary content of the passages. With the texts judged by readability formulae to be harder, mode of presentation tends to affect misunderstandings to a greater extent. Its general effect is considerable, but individual texts, showed themselves to be affected in different ways.

5.5.9 *INTERACTION BETWEEN TEXT AND LOCATION*

The other factor which was considered in relation to text was location. Rural and urban groups' errors were analysed separately to see if the patterns of scores on each text were similar for each location

TABLE 5:27

Effects of Text on Urban Pupils

No.	Category of Error	Train	Feast	Dragon	City	Total	χ^2	p
3.	Influence of previous knowledge	12 (9.8)	62 (46.0)	8 (4.8)	25 (17.5)	107 (18.9)	92.85	p<0.001
4.	Confusion of word meaning	0 (0)	6 (4.4)	3 (1.8)	18 (12.6)	27 (4.9)	28.68	p<0.001
5.	Discrimination errors	0 (0)	1 (0.7)	10 (6.0)	6 (4.2)	17 (3.0)	11.97	p<0.01
6.	Disregard of stated facts	74 (60.7)	29 (21.5)	88 (52.7)	51 (35.7)	242 (42.7)	50.63	p<0.001
10.	Transposition	3 (2.5)	13 (9.6)	20 (12.0)	7 (4.9)	43 (7.6)	11.45	p<0.01

Figures in brackets indicate percentage of total errors. Full results are given in Appendix 2, Table 27.

Five categories showed that there was a significant effect of texts on the urban subjects. Four categories, 'Influence of previous knowledge', 'Confusion of word meaning', 'Disregard of stated facts' and 'Transposition' showed the same

relationship with the rural subjects, for whom the 'Discrimination error' category did not reach the $p<0.01$ level.

TABLE 5:28

Effects of Text on Rural Pupils

No.	Category of Error	Train	Feast	Dragon	City	Total	χ^2	p
1.	Extraneous items	7 (7.3)	17 (13.7)	7 (4.5)	3 (2.4)	34 (6.8)	14.61	p<0.01
2.	Predominance of stereotypes	3 (3.1)	0 (0)	4 (2.5)	10 (8.0)	17 (3.4)	12.84	p<0.01
3.	Influence of previous knowledge	13 (13.5)	50 (40.3)	7 (4.5)	26 (20.8)	96 (19.1)	60.02	p<0.001
4.	Confusion of word meaning	0 (0)	0 (0)	2 (1.3)	11 (8.8)	13 (2.6)	26.04	p<0.001
6.	Disregard of stated facts	70 (72.9)	42 (33.9)	80 (51.0)	53 (42.4)	245 (48.8)	31.70	p<0.001
7.	Literal information	1 (1.0)	6 (4.8)	12 (7.6)	0 (0)	19 (3.8)	13.70	p<0.01
8.	Reproduction	0 (0)	2 (1.6)	13 (8.3)	5 (4.0)	20 (3.9)	13.38	p<0.01
10.	Transposition	3 (1.0)	5 (4.0)	19 (12.1)	9 (7.2)	34 (6.8)	13.59	p<0.01

Figures in brackets indicate percentage of total errors. Full results are given in Appendix 2, Table 29.

Eight categories of error showed that there was a significant effect of texts on the rural subjects. Three categories, 'Influence of previous knowledge', 'Confusion of word meaning', and 'Disregard of stated facts', were significant at the $p<0.001$ level

while 'Extraneous items', 'Predominance of stereotypes', 'Literal information', 'Reproduction' and 'Transposition' all reached the $p<0.01$ level of significance. The effect of text on rural pupils were therefore greater than on urban pupils and the error categories were different.

5.5.10 *INTERACTION BETWEEN LOCATION AND MODE OF PRESENTATION*

The other analysis which was carried out was of the remaining factors, location and mode of presentation. The calculation of chi-squares demonstrated that both urban and rural groups were affected by the manner in which material was presented, and almost to the same extent. With the rural subjects all categories of error were found to have chi-squares $p<0.001$ except 'Confusion of word meaning' which was also significant but at the $p<0.01$ level.

With urban subjects only one category, 'Predominance of stereotypes', did not reach $p<0.01$ while the other nine were significant at $p<0.001$. It would seem that the location factor may have had a slight effect on the way the material was handled by the two groups of subjects, but as has already been found, the mode of presentation has great influence on the type of errors made by pupils in these top primary classes. As this is a factor which can easily be manipulated by teachers it is important to realise that certain ways of presenting material may give a truer picture of some aspects of pupil understanding than other modes of presentation.

TABLE 5:29

Effects of Mode of Presentation on Rural Groups

No.	Category of Error	Free Writing	Directed Writing	Free Drawing	Directed Drawing	Total	χ^2	p
1.	Extraneous items	19 (20.4)	0 (0)	15 (7.4)	0 (0)	34 (6.8)	44.07	p<0.001
2.	Predominance of stereotypes	1 (1.1)	0 (0)	15 (7.4)	1 (0.8)	17 (3.4)	17.02	p<0.001
3.	Influence of previous knowledge	6 (6.5)	14 (17.1)	39 (19.3)	37 (29.6)	95 (18.9)	18.75	p<0.001
4.	Confusion of word meaning	1 (1.1)	1 (1.2)	2 (1.0)	9 (7.2)	13 (2.6)	14.04	p<0.01
5.	Discrimination errors	5 (5.4)	6 (7.3)	0 (0)	0 (0)	11 (2.2)	21.78	p<0.001
6.	Disregard of stated facts	20 (21.5)	23 (28.0)	131 (64.9)	71 (56.8)	245 (48.8)	65.89	p<0.001
7.	Literal information	4 (4.3)	11 (13.4)	0 (0)	4 (3.2)	19 (3.8)	29.01	p<0.001
8.	Reproduction	20 (21.5)	0 (0)	0 (0)	0 (0)	20 (4.0)	91.61	p<0.001
9.	Justification	6 (6.5)	7 (8.5)	0 (0)	0 (0)	13 (2.6)	25.69	p<0.001
10.	Transposition	11 (11.8)	20 (24.4)	0 (0)	3 (2.4)	34 (6.8)	62.53	p<0.001
	Total	93 (18.5)	82 (16.3)	202 (40.2)	125 (25.0)	502		

Figures in brackets indicate percentage of total errors. Full results are given in Appendix 2, Table 29.

TABLE 5:30

Effects of Mode of Presentation on Urban Group

No.	Category of Error	Free Writing	Directed Writing	Free Drawing	Directed Drawing	Total	χ^2	p
1.	Extraneous items	19 (21.6)	2 (1.9)	25 (12.3)	1 (0.8)	55 (9.7)	41.33	p<0.001
2.	Predominance of stereotypes	6 (4.8)	0 (0)	12 (5.9)	4 (3.1)	22 (3.9)	7.13	NS
3.	Influence of previous knowledge	14 (11.2)	14 (13.0)	39 (19.2)	40 (30.5)	107 (18.9)	18.92	p<0.001
4.	Confusion of word meaning	4 (3.2)	4 (3.7)	1 (0.5)	18 (13.7)	27 (4.8)	32.38	p<0.001
5.	Discrimination errors	2 (1.6)	15 (13.9)	0 (0)	0 (0)	17 (3.0)	55.21	p<0.001
6.	Disregard of stated facts	11 (8.8)	38 (35.2)	126 (62.1)	67 (51.1)	242 (42.7)	96.16	p<0.001
7.	Literal information	7 (5.6)	8 (7.4)	0 (0)	1 (0.8)	16 (2.8)	19.72	p<0.001
8.	Reproduction	30 (24)	0 (0)	0 (0)	0 (0)	30 (5.3)	12.01	p<0.001
9.	Justification	8 (12.8)	0 (25.0)	0 (0)	0 (0)	8 (7.6)	28.69	p<0.001
10.	Transposition	16 (12.8)	27 (25.0)	0 (0)	0 (0)	43 (7.6)	79.00	p<0.001
	Total	125 (22.0)	108 (19.0)	203 (35.8)	131 (23.1)	567		

Figures in brackets indicate percentage of total errors. Full results are given in Appendix 2, Table 30.

The fact that all categories of error were shown to be significantly affected by mode of presentation for both urban and rural groups of pupils seems more likely to be due to the manner in which the task was presented than to the location of the subjects as the latter on its own did not significantly affect the category system.

Over the four passages the percentage of direct quotes was 14.18%. The Train passage which had the lowest reading age level – 7.41 y, had the fewest quotes 9.41% but the highest number of quotes – 17.05% were found in the Feast text. Those which were rated to be more difficult – 12.5 y and 13.1 y had 14.9% and 15.27% respectively. The bulk of the words and phrases quoted came from the first half of each passage, as if at a certain point the pupils felt that they had written enough, and disregarded the rest. Full results are given in Appendix 2, Table 34.

5.6 SUMMARY

TABLE 5:31

Number of Categories of Error Registering Significant Interactions

		Interaction with Effect of		
Effect	Age	Presentation	Ability	Location
Text	1	27	11	13
Age		1	2	2
Presentation			17	19
Ability				3

The two factors which appeared to have the greatest effect on the error totals and their distribution were text and mode of presentation, both of which are under the control of the teachers. Age and ability which the pupils bring to the comprehension task were not major factors, although subjects covered a considerable range of each. Locations had a possible minor effect which might be increased with very different locale e.g. inner city, when the contrast between the rural and urban environment would be greater.

Analyses of the error totals as assigned to categories under the five main effects, showed that the choice of text and the manner in which the comprehension task was presented significantly affected the frequency with which errors were recorded in at least seven of the 10 categories.

On the other hand, ability had no significant effect on any of the error category frequencies, while age only significantly affected the frequencies with which errors were allocated in two categories, 'Disregard of stated facts' and 'Justification'. Age and ability are two factors much considered by teachers when matching textual material to pupils. Location, meaning local environment, likewise had a significant effect on the frequency with which errors were recorded in only one of the categories, although it is a factor regularly quoted as affecting the educational progress of children.

CHAPTER 6

Discussion Of Results Of Main Study

6.1 MAIN EFFECTS

The categories of errors recorded by the experimental group were analysed according to five main effects. These were text, age, mode of presentation, ability and location. Chi-square was the statistic used for analysis. The main findings set out in the previous chapter are summarised in the following table that shows which categories of error were significantly affected by each of the five variables.

Table 6:1

Categories Showing Significant Differences
Related to Main Effects

No.	Category of Error	Text	Age	Mode of Presentation	Ability	Location
1.	Extraneous items	-	-	*	-	-
2.	Predominance of stereotypes	*	-	-	-	-
3.	Influence of previous knowledge	*	-	*	-	*
4.	Confusion of word meanings	*	-	-	-	-
5.	Discrimination errors	*	-	*	-	-
6.	Disregard of stated facts	*	*	*	-	-
7.	Literal information	*	-	*	-	-
8.	Reproduction	-	-	*	-	-
9.	Justification	-	*	*	-	-
10.	Transposition	*	-	*	-	-

The overall effects were judged to be significant if the value of chi-square between frequencies showed to be significant at $p>0.01$. Interactions between the main effects were recorded as significant according to the same criterion.

6.1.1 *TEXT*

The same texts were used across the age groups and treated as a composite sample of texts which might possibly be used in these classes.

The complete range of textual difficulty should have offered some material appropriate to each group. The subjects' world knowledge, although it cannot be exactly calculated, may possibly be to some extent assessed. Similarly miscomprehensions which are not displayed in overt responses may only be guessed at, but those offered do give an indication of the subjects' level of understanding.

The error totals for each individual text, when arranged in order, were in exactly the same order as the reading levels calculated for each passage, with the Dragon, the most difficult text, producing the most errors and the Train, the text rated to be the easiest, giving rise to the fewest. This would have been intuitively expected. Significant differences were found in seven out of the ten categories of error when the overall effect of the group of texts was calculated.

6.1.1.1 Extraneous Items

The findings of Adele Abrahamson (1975) with undergraduates studying text in California suggest that subjects "pick a very few salient elements and use whatever language is handy to express them, with little concern for what else is dragged in or excluded by the choice". These findings are consistent with some of the results of this research although the subjects were much younger. If primary pupils employ the same technique when producing textual outcomes, that would contribute to the large quantity of extraneous items introduced in the protocols.

This technique may be employed with more difficult texts or when reading quickly or under stress. Then subjects might find it harder to get the gist of the passage. However although the results were not significant, they showed that the two easier texts produced 53 errors in this category while the two rated to be more difficult gave rise to 36 – the opposite to what would be expected. A possible explanation is that the simpler syntactic structure of these passages imposed fewer demands on cognitive processing capacity (Britton *et al.*, 1982). That would allow more for embellishment of the text with items from the reader's previous knowledge store. Cognitive capacity is defined by Johnston & Heinz (1978) as "the limited pool of energy, resources or fuel by which some cognitive processes are mobilised and maintained" (p. 422). It seems reasonable to suppose that any surplus resources were used to add extra extraneous detail to the free recall protocols. It is also possible that these extraneous details were already held in elaborated schemas before the subjects began to read these texts.

6.1.1.2 Predominance of Stereotypes

A definite idea that 'things are so' produced the category described as 'Predominance of stereotypes'. Diane Schallert (1982) writing about Craik & Lockhart's (1972) Depth of Processing Theory says "the model predicts that subjects' performance in memory tasks will preserve real world information at the expense of linguistic information". The prevalence of green dragons when the text explicitly referred to a golden one was one example of stereotyped dragons. Although not a real world fact, the information that dragons are green is so amply supported by illustrations in children's literature, that it almost becomes a fact.

Another notable example of adherence to stereotypes was found in the Train text protocols. The text referred to a safari type train which ran through the jungle allowing the passengers to view the animals in their natural habitat from the safety of barred carriages. This textual information was frequently disregarded because of the stereotyped idea that monkeys, not people are kept in cages. Bartlett (1932) reported this adherence to stereotyped situations.

The idea of stereotyped shapes in children's drawings is put forward by Kellogg (1969) who writes "Buildings are drawn by combining diagrams, the archetypal or universal shapes indigenous to child art". This partly explains the many traditional two-up, two-down houses which appeared in the illustrations of the Indian city. On the other hand it may be that they do not know what else to draw to satisfy their teachers. Children sharing the same environment would be quite likely to

combine the shapes they see around them, when drawing houses. Sanford & Garrod (1981), discussing Bartlett's (1932) research noted that "systematic distortions crept in which fitted the story, the subjects sometimes invented plausible stories around details, and there was adherence to stereotyped situations". Their report also supports the present results.

The script theory of Schank & Abelson (1977) proposes that items of stereotyped knowledge e.g. going to a restaurant, are represented as scripts in the memory. It would seem that some of the subjects' established ideas, such as the greenness of dragons, take similar forms.

6.1.1.3 Influence of Previous Knowledge

Debating the relative contributions of the text and the reader in the response of ninth grade students to a passage of literature, as opposed to specially constructed text, Golden & Guthrie (1986) found reading comprehension to be a constructive activity involving both, as also found by Bartlett (1932) and Spiro (1980). They point out that the prior knowledge readers bring to the text is not merely that related to the facts in the text, but also the wide spectrum of experience, beliefs, hopes fears etc, which are part of the personality. This distinction is an important one for this study, as the point was raised by teachers that pupils could not properly understand the Feast text unless they had previously been taught about the Vikings. The 'teach and test' formula is very prevalent in some areas of education, but there is a place for reading unfamiliar text for information or enjoyment apart

from specific lessons. Throughout this study it was clear that very broad general knowledge, as well as previously known facts about Vikings, was drawn upon by the subjects in their responses to the texts.

The Dragon text about which they could have least previous knowledge, produced the fewest errors. The Train text did not produce many more which is not so surprising when it is realised how many primary children in this geographical area have little experience of trains. Cars and buses are the normal form of transport and children are probably more likely to have flown abroad on holiday than to have travelled by train. The City text gave rise to the next highest total, but the Feast text resulted in more than double that number of errors. The two subjects of which the pupils were likely to have most knowledge were those on which they presented most errors. Half of the subject sample lived in a town, and facts about Vikings are frequently taught in school. Graesser & Haberlandt (1986) found words and ideas to activate more knowledge-based inferences in narrative passages than in other types. Essentially the City and Feast texts did not differ from the two other texts in style. The two more narrative texts were the Train and the Feast while the Dragon and the City seemed more descriptive. Study of the protocols suggests that it was more likely to be the topics, which activated the inferences which the readers made from their previous knowledge, and as mentioned in the discussion of extraneous material, a few words to have sparked off lines of thought.

Chou *et al.* (1989) working with fourth, sixth and eleventh grade subjects found that texts containing information that differed from subjects' experiences were specially prone to reader–based constructions, while some texts seemed to activate subjects' knowledge of familiar related information not mentioned in the text. Both of these findings are relevant to the current research results. The Jungle Train was completely different from any the subjects might have seen while the Feast was set in Viking times. Moreover the City described by Rudyard Kipling bore little resemblance to the one which the children knew. Trains, feasts and cities are real, however, while dragons are not. They are also familiar to the children.

Bransford & Johnson (1972) believe that prior knowledge of a topic e.g. Vikings, does not guarantee its usefulness for comprehension. For it to be useful it would have to be an activated schema. These researchers feel that the topic is more than a schema which readers can use to aid comprehension. They feel that the topic of the passage may help readers to create contexts which can be used to make the passage comprehensible. This the readers would appear to have done. There are swings and roundabouts in city parks, and a record player providing music for the Viking feast, indicating that the pupils had created contexts which they could understand (Figs. 12–13). They related the texts to their own experience. Bransford & Johnson (1972) believe that knowledge of the topic of a passage may be neither necessary nor sufficient for optimal comprehension. This was indicated in the pilot studies where pupils who had just had a school expedition to the Jorvik Centre in York failed to connect the Feast text with Vikings. Peeck *et al.* (1982) found that in educational settings, fifth graders tend to keep the textual material

FIGURE 12

Influence of Previous Knowledge: Swings and roundabouts in city park.

FIGURE 13

Influence of Previous Knowledge: Record-player at Viking Feast.

isolated from prior knowledge and treat school material as unrelated to everything outside of school. This would explain the children's failure to make links with knowledge which they undoubtedly had.

A finding of Schank & Abelson (1977) was that what was selected, interpreted and combined with previous knowledge was determined by the knowledge structures of the reader, while Paivio (1971) felt that isolated details might be remembered as images instigated by the textual input and from these other details be recalled from related past experience to act as a 'schema', around which the response was built. It would seem that the subjects in this present study formed images of cities and celebration meals thereafter constructing free recall protocols from experience which were no way in the minds of the authors of the texts.

6.1.1.4 Confusion of Word Meanings

Confusion of word meaning involved the wrong choice of meaning of the target word where there were two or more possibilities. Notable were the illustrations of 'creepers' as insects instead of plants and 'low' used to express position rather than quantity. Drawings of "his fires were low in slumber" showed a fire low down on the page and almost under the sleeping dragon. The ridiculous aspect of the situation did not seem to register. Bereiter & Scardamalia (1983) found comprehension in immature readers "to show signs of being more of a single pass process with details being important or unimportant, true or false, at the moment of first encounter. It seemed that the subjects registered the words when they first

read them and did not notice that the meaning they were attributing to some of them, did not fit into the texts. This form of error did not appear to be related to textual difficulty as the Dragon text, rated to have the highest reading level, only produced five errors while the City text yielded 29. Errors arising from confusion of word meaning seems to be text specific, and depend on the number of words in the passage having more than one meaning rather than on a textual structure.

When researching children's ability to detect nonsense words, falsehoods and inconsistencies in text, Zabrucky & Moore (1989) found that the ability to integrate information across sentences was the latest to develop and was becoming established in sixth grade (11.96 years average). It seems probable that lack of skill in detecting inconsistency was the reason for this type of error as most pupils would know the meanings of words such as 'low' in sentences like 'the water level was low' and 'he spoke in a low voice'. Children's ability to handle individual examples is no guarantee that they can understand the same words in a continuous text. Indeed when looking up a dictionary to find the meaning of a word in a passage they may be observed to have considerable difficulty in locating the correct meaning if more than one is given. This present research shows that as well as failing to locate inconsistencies, children of primary school age can happily create them.

6.1.1.5 Discrimination Errors

'Confusion of word meanings' and 'Discrimination errors' were related categories. The latter occurred only in the written protocols and involved visual misreadings of the word, such as 'palace' recorded as 'place' and 'thrust' as 'thirst'. When the chosen rendering did not fit in with the text, justification sometimes followed e.g. "the elephant had a thirst and ate the juicy grass" as explanation of the sentence "the cobblestones in the courtyard where the king's elephants used to live, had been thrust up and apart by grasses and young trees" (Fig. 14). This is an example of the reader making causal inferences to link story statements (Thorndyke, 1976) and plausible stories invented around details (Bartlett, 1932).

'Discrimination errors' appear to be linked to the difficulty of the passage as they were directly related in quantity to the reading level of each text, with the hardest text (Dragon) producing 16 errors while the easiest (Train) yielded none. When the readers are tackling the harder texts they are more likely to read in smaller chunks and possibly to grasp at what seems more visually familiar. 'Place' and 'thirst' are likely to be more frequently used in children's language than 'palace' and 'thrust'.

6.1.1.6 Disregard of Stated Facts

It was especially interesting to note, while observing the pupils as they tackled the practical assignments, how little reference they made to the text after the initial

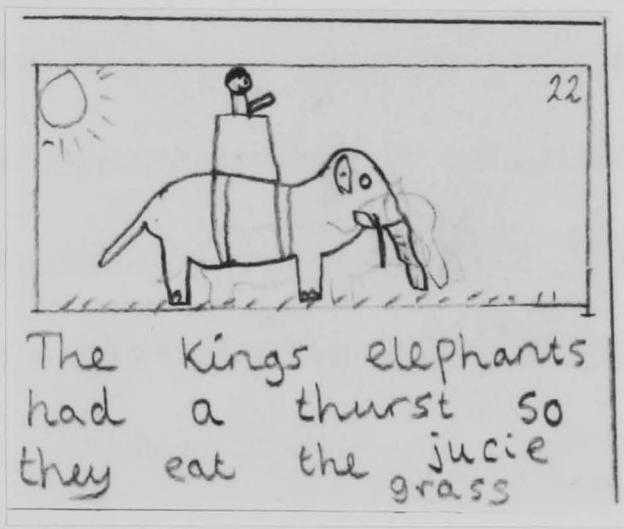

FIGURE 14

Discrimination Error: 'The king's elephants had a thirst and ate the juicy grass'. Mis-reading of thrust leads to justification of statement.

reading. Entire classes worked together on the tasks so that target subjects were unaware of their situation. Generally the pupils seemed quite confident that they knew what the text was about, without checking.

Like Piaget, Markman (1979) noted the pupils' confidence that they had grasped the textual message. She found "11–12 year old children can listen while explicitly contradictory material is read to them for the second time and still judge that they have fully comprehended the material" (p. 654). From observation it seemed that the pupils used mainly the information which they had initially assimilated, in the production of the protocols. Inconsistencies between their productions and the textual message seemed to pass unnoticed, a fact which would contribute to the large numbers of category 6 errors (Disregard of stated facts) which occurred at all age levels and points to future study problems in secondary school.

This error category did not appear to be related to textual difficulty as the easiest (Train) passage accounted for 66.0% errors while the hardest (Dragon) accounted for 51.9%. The 'Feast' text rated second lowest in the reading level terms produced only 27.4%. The two texts which did produce the most errors were those which it is supposed the readers would know least about so unfamiliarity is a possible contributor to this category of error.

6.1.1.7 Literal Information

There are similarities between the lack of analysis displayed in the production of errors of the above category and the category of 'Literal information' where the printed word is taken at its face value without further probing to see if the meaning fits the circumstances. Examples found in illustrations were "some king built it" showing the king complete with crown and builder's trowel, and "the longhouse rang with their laughter" showing a 'ting–a–ling' of a bell. These misunderstandings do not show up in the verbal protocol which merely quotes the phrase, but pupils may have discovered that skilful quotation can disguise miscomprehension or inability to offer explanations for what they quote. It probably does not occur to a teacher busily marking pupils' work, that the child who answers "some king built the city" derives from the words a mental image completely different to that expected by the teacher and by the author. Pupils may have come to realise what the teacher seems to want, i.e. an apparently competent answer, and have found a method of surface processing by which they can achieve that. Chomsky (1957) postulated that sentences had a surface structure and an underlying deep structure. The former related to the grammatical interpretation of the sentence while the deep structure related to its meaning. When making errors in the 'Literal information' category, readers may only be processing the surface structure and omitting the underlying semantic interpretation which is necessary for comprehension. Alternatively they may have insufficient world knowledge to make the expected interpretations. Fulcher (1989) suggested that failure to see the semantic links in text might lead to failure to construct a mental model to enable

readers to comprehend the message of the text. Townsend & Bever (1988) thought that such surface processing was most likely to happen with the more difficult texts i.e. those with higher readability level, when readers might be forced to read in a more word by word manner. This is supported by the fact that the 'Dragon' text yielded by far the most examples of this category of error 6.5%, but does not explain why the City text, only slightly easier, accounted for only 1.9% of examples which was less than the 2.3% produced in 'Feast' text which was rated to be much simpler in reading level terms.

6.1.1.8 Reproduction

In the Reproduction category where error totals were not significant, children reproduce the words of the texts but betray their misunderstandings in the way they link the fragments together. The number who manage to handle this reproduction technique successfully and do not indicate their lack of understanding, is impossible to calculate but is hinted at by the disparity between the drawing and writing protocols of some apparently competent children. The pupils mentioned to me as learning support teacher were those who had not mastered this strategy. It came as a great surprise to class teachers that pupils whom they considered to be competent could present the same errors, even if less frequently.

In a study of fifth and seventh graders, Brown & Day (1983) describe a "copy-delete" strategy employed in summarisation tasks. Pupils (1) read text sequentially; (2) decide on inclusion or deletion, and (3) copy the sentence more

or less verbatim. Examples of this strategy were found in the Reproduction category e.g. "There Smaug lay wings folded like immeasurable Bat turned so that Bilbo could see his underparts. He never has yet come home to him" (Fig. 15).

In this study the most errors in the Reproduction category were produced in the Dragon protocols (7.4%) with the City (4.9%), Feast (3.9%) and Train (1.4%) ranking in order from hardest to easiest text. It may be that the extra attention required to process systematically a text of higher reading level allows less for penetration of the underlying semantic level. The assessments of readability level, the Fog Index, Gunning (1952) and the Fry Readability Graph (1968) used in this research depend on readily quantifiable aspects of sentences in the text. They do not calculate semantic complexity.

The Reproduction category is defined as "verbatim presentation of given words and phrases, showing that they have not been absorbed and understood". 'Parroting', or repetition of the exact textual material, formed a large proportion of the written protocols at all stages of the study (Appendix 2, Table 34) but as long as responses were correctly presented, it was impossible to ascertain whether or not the reader really understood the text or merely reproduced it skilfully. The expertise with which this can be done is probably why teachers often suppose that pupils understand more than they do.

Bormuth *et al.* (1970), working with fourth grade, semi-rural pupils in America also found that "large proportions of students were unable to demonstrate

The golden dragon was fast asleep his jaws and nostrils, and wisps of smoke, but his fires were low. -is' Slumber. Beneath him, under all his limbs and about all sides. Under the dragon there were crusted with jewels and fragments of gold beside him. But the glory of such treasure had never yet come home to him.

The golden dragon was fast asleep, his jaws and nostrils and wisps of smoke but his fires were low is slumber. Beneath him, under all his limbs and about all sides under the dragon there were crusted with jewels and fragments of gold beside him. But the glory of such treasure had never yet come home to him

FIGURE 15

Reproduction: Fragments of text strung together betray misunderstanding.

comprehension of basic syntactic structures". By this he referred to the widespread inability he found amongst subjects studying textual excerpts to answer questions beginning with 'wh' words e.g. who, which, what, to understand anaphoric references and to make necessary syntactic links between sentences. Bormuth pointed out that through these basic structures, text signals information and educational progress heavily depends on pupils' ability to understand the written language in the school curriculum. In Bormuth's research, the texts were retained and there was no time limit on the exercise. Although the time in the present study was limited, it was adequate for the purpose, and the results in this category are supported by the above research carried out with readers in a similar situation and of approximately the same age (10 years). The errors appearing in the Reproduction category showed a similar lack of understanding of textual meaning in the way they incorrectly reproduced excerpts of text as answers.

Zabrucky & Moore (1989), report that their findings from children of the 10–12 year old age groups, suggest that children's oral reports of their understanding may be unreliable in that their answers, if closely quoting text, can give a false impression of understanding. If children quote correctly from the text being discussed it may be assumed that they have grasped the meaning of it. They may merely have manipulated the words without having understood their meaning. This is important in view of the prevalent classroom practice of discussion of texts as an alternative to written answers. The present research demonstrates that children's written reports if they reproduce portions of text can also be an unreliable indicator of comprehension.

The unreliability of verbal reports is also mentioned in the work of Garner & Anderson (1981–82) who recorded that responses do not always reveal gloss–overs, which seem similar to reproduction, and gaps in knowledge. Whether the information omitted in the protocols of this study was omitted because of lack of understanding, or because of some other selection process such as rating of importance is also impossible to ascertain. Garner & Anderson report a text bound system similar to that found in this study to be mostly used for recall purposes.

Practice of reproduction technique i.e. answering by exact quotation of fragments of text was the only evidence of much back–checking to the retained text. Apart from this re–reading necessary for verbatim transcription to form summaries, readers appeared to make little use of the text once they had initially read it. This practice was apparent across the age groups.

6.1.1.9 Justification

Individual texts displayed differences in the number of errors in the Justification category produced but the difference was not significant. The Dragon text produced eight justification errors while the easier two produced four each. In view of the fact that the reading level of the four texts ranged from 13.1 years to 7.6 years a greater difference in error scores would have been expected. It would seem that material of a considerable range of textual difficulty was handled in much the same way. It seems likely that the reading level of the text would be related to the finding of Stein & Glenn (1979) who write "substitution of more

probable events may help the processor to maintain the structure and semantic cohesiveness of the story". If readers could not understand a text they would more probably place their own construction on it in an attempt to make it meaningful as children expect the printed work to make sense. Mandler (1984) wrote "it has been shown over and over again that people either discover structure inherent in the world or impose structure upon it".

As previously mentioned, 'Justification' errors often followed 'Discrimination errors'. This is supported by Rumelhart (1980) who explained the comprehension process as one of constructing a theory, testing it against the available data and if it does not properly match, dropping it and searching for another. If discovered, a more plausible or consistent explanation would be used but it might be quite different from that which the author intended.

6.1.1.10 Transposition

In this Transposition category there was a definite effect of text, Dragon text giving rise to 12.0% errors while the Train text, the easiest only resulted in 1.8%. The relationship between text and error with the other two texts, – City 6.0% and Feast 6.9% was less clear.

Although for this research, the selected texts are treated as a random sample, it is interesting to note that the Dragon text produced more than twice as many errors in the Transposition category as the other texts. It seems worthy to note that the

Dragon text was the only really fictitious text in the group. Most children could bring to the texts, some knowledge of trains, feasts and cities. Their previous knowledge of these subjects may have formed a framework into which incoming information could be fitted, thus lessening the memory load of individual facts. Without such a definite framework, isolated units of information could easily be misplaced in the attempt to understand the text.

Observation of individual answers and subsequent questioning of some readers who did the follow–up interpretation exercises, suggests that pupils who produce transposition errors read in a more holistic manner, and derive a global view of the text in which individual words become displaced. A boy who wrote of a red dragon was determined that that was the textual description until back–checking and visual evidence proved otherwise.

6.2 AGE

Perhaps the most surprising finding of this research was that age, covering four primary classes generally had no significant effect on the distribution of total errors in categories. Only two, 'Disregard of stated facts' and 'Justification', were significantly affected. There appears to be a developmental trend in overall totals with the youngest group producing more errors than the other three classes which show only slight decreases from year to year. Part of the problem experienced by younger children in retaining textual information may be that the processing demands are too great. One or two dimensions or instructions seems to be as

much as can be held in memory at one time. Processing capacity does increase with age (Paris & Upton, 1976) so perhaps shortage of processing and storage space contributes to the greater error totals of the younger readers.

The results suggest that there is a change between the 8–9 year old group and the group immediately following but no change or only the slightest tendency towards change between the succeeding age groups. The youngest group may have had decoding problems which contributed to the overall error total. The research of Piaget (1926) found a change in process from pre–operational to concrete operational thought over this age group which might help explain this change. He proposes that the change takes place around 7 years and that the concrete operational stage lasts until around 12 years. As children develop at different rates, the concrete operational stage could be well established by PV (age nine) whereas in PIV (aged eight) it might not be completed for all subjects. According to Piagetian theory therefore no significant change in thought processes should take place during the final three years at primary school. Although there are fluctuations in error totals for individual categories, the trend of the results of this research appear to be in line with Piaget's findings.

In the Assessment of Achievement Study of English Language (1988) the Scottish Education Department researchers found that the top 10% of primary IV pupils functioned as well as the average second year secondary pupil at treating a text as a coherent unit. This apparent similarity in reading ability over a wide age range is in line with the lack of significant development in comprehension skills found

over the top four primary classes in this present study. It is, however, an important finding for current teaching practice, which frequently does not seem to be fostering the development of higher order reading skills. Testing methods tend to be quantitative in standardised tests. Qualitative assessment would probably show greater difference between primary and secondary results. Englert *et al.* (1984) feel that this lack of development is caused by lack of prior knowledge and lack of specific necessary skills.

Age level did appear to be associated with certain categories of error, but this was shown not to be statistically significant.

6.2.1 *EXTRANEOUS ITEMS*

McClelland (1984) suggests that pupils accept facts at face value and do not attempt to understand or define them unless it seems to be worthwhile. They use the analogy of modern technology which we need not understand in order to make machines work. We simply need to press the correct button. Similarly it would be reasonable to accept that pupils, having found that simple selection strategies satisfy the teacher, would make no deeper enquiry into the meaning of texts. When pressed, McClelland suggests "a final strategy is instant invention". When young children do this it is often transparent because it is ridiculous, but, with increasing sophistication, it becomes less and less detectable. This comment supports the decline in the category of Extraneous items from PIV, the youngest group, to the other three classes who each present little more than half the PIV

total. Englert *et al.* (1984) discovered that third grade readers included more intrusive information than older readers because they could not distinguish between what was relevant and what was not when tackling comprehension problems.

6.2.2 *INFLUENCE OF PREVIOUS KNOWLEDGE*

As mentioned in the preceding category, younger children are likely to have less general knowledge on which they can draw for comprehension purposes. However, Paris & Upton (1976) found that 6–7 year olds go beyond the information actually given, so apparent differences between younger and older readers may be due to methods of encoding rather than to amount of previous knowledge.

Scrutiny of the actual numbers of errors in this category shows that although PIV made 24.3% errors and there is a big drop in total by PV which made only 20%, when PIV and PV are added together they total 101, while the total errors of PVI and PVII come to 102.

Presuming that the ability to link stored information to material extracted from text, aids the understanding of it (Collins & Quillian, 1972), it would be expected that older pupils would produce fewer errors in this category. Graesser (1981), however suggested that although prior knowledge leads to easier interpretations, it may also lead to the generation of more inferences. If these inferences are incorrect or only partly correct, more errors would be likely to be produced by the

older readers. This may be the explanation for these results.

6.2.3 *CONFUSION OF WORD MEANING*

There was only a difference of five errors between the highest and lowest frequencies in this category with the youngest group making 13 and the oldest making 10 errors. The scores dropped to nine and eight for the intermediate groups. This pattern of a drop in score between PIV and PV with a rise again by PVII is demonstrated in another six of the error categories when they are analysed to show effects of age. It would appear that some maturational change may take place between PIV or PV, or that some other factor, such as instructional methods or skill comes into play at this stage, but that by, PVII, some other influences such as increased world knowledge, or personal attitudes with the approach of secondary school, begin to have a negative effect on comprehension of text. Because the error totals are small in this category, they can only suggest trends. Zabrucky & Ratner (1985) suggest that the factors which cause pupils to realise that they are misunderstanding may be much more complex in sixth grade than in third grade. When researching into comprehension – monitoring in a recall from memory, situation, these researchers found that sixth grade pupils tended to have more failure than the younger group, and considered the finding to be connected to the greater memory capacity for information of the older readers. Presumably if readers have more stored information on which they can draw when trying to make sense of text, there are likely to be more interconnections between facts stored in semantic memory. If these are used to access material there may be more room

for confusion of meanings where more than one is stored. If, for example, a pupil knows two meanings for the word 'cricket' – a game and an insect – there is greater possibility of selecting the wrong one. That would explain the pattern of errors in 'Confusion of word meaning' category and may be relevant to the other categories where the same error pattern is followed – 'Extraneous items', 'Predominance of stereotypes', 'Influence of previous knowledge', 'Discrimination errors', 'Literal information' and 'Transposition'. The free recall methods used in this study may have encouraged extra information to be brought to mind and contributed to this error pattern, and the older the child the more stored information he or she would be likely to have.

6.2.4 *DISCRIMINATION ERRORS*

A possible explanation of the above pattern of errors in the 'Discrimination errors' category where the two younger classes made six errors each as compared to the eight made by each of the older ones, is that found by Rayner (1976). In a word recognition experiment he found a clear developmental trend which showed that with increasing age, subjects were more likely to choose alternatives with the same shape, as the stimulus. Presumably, on average, older pupils read more quickly and have more expectation that their reading (i.e. decoding) will be correct, than the younger pupils so it seems likely that they might have a greater tendency to mis-read 'palace' as 'place' etc. Zabrucky & Moore (1989) found that lexical standards of evaluation (detecting nonsense words) developed early and did not show improvement with increasing age – another relevant finding to support this

'error' category.

6.2.5 *DISREGARD OF STATED FACTS*

The results in this category showed that age had a significant effect on the likelihood of the readers adhering to the message of the text. Apart from a slight rise in error total in PV, there was a clear downward trend in error total in PIV (130) to PVII (102).

When writing of the 9–11 year olds who had tackled a test in which proverbs had to be matched to explanatory sentences, Piaget (1926) stated, "the child really believes that he has understood" (p. 129). Consequently these readers do not stop to analyse unfamiliar words or details but create new schemas which reconcile facts that they believe they have read. It would seem that having grasped what seemed to be the meaning, the younger subjects in this present research disregarded other information which could not be assimilated into their new schemas, and merely quoted, without analysing, parts of the text which were difficult or unfamiliar.

The number of examples where readers had completely disregarded facts stated in the passages, showed little change between PIV and PV, but dropped noticeably both in PVI and again in PVII suggesting either that with greater maturity, more attention is paid to the information in the text, or that the pupils have become more skilled in the process of selection and omission.

Paris *et al.* (1977) found that in a listening task, 7 and 8 year old pupils rarely constructed inferences from the actual sentences in the way that older children did, while Brown & Smiley (1978) found that there was a clear developmental trend in the ability to extract the important elements of a text. Third grade pupils could not reliably distinguish between important and unimportant facts while fifth graders were only beginning to do it successfully. These researchers did point out that readers' general knowledge and the complexity of the texts also had a bearing on this ability. As the present research covered a group of texts and the findings were thus somewhat averaged and the subjects covered a group of schools, it seems reasonable to assume them to be fairly general and to feel that they are supported by these other pieces of research. The younger readers, failing both to find the links between the sentences and the important facts, would be more likely to launch into other interpretations which to them made sense of the text. This tactic was demonstrated by some of the younger subjects in particular who appeared to latch on to some of the words of the passage and construct their own stories around them.

The younger pupils seemed to tackle the text in a more serialist manner, looking at only one part at a time and failing to make many of the necessary links between them. Methods of reading instruction used in early primary classes may have a bearing on this as the general practice in this area is still to progress, one or two pages per day through basal readers. The result is attention to fragmented text with much of the continuous story theme disregarded. An expectation of reading sections independently may become established.

6.2.6 *LITERAL INFORMATION*

There is a developmental pattern of error total decreasing with age until PVII which suddenly produces more errors even than the youngest readers, although the effect is not significant. Some of the maturational changes and other contributory factors already mentioned may play a part in this but, in general, knowledge should result in an upward error score trend from PV to PVII. In this category the sudden jump in error total comes between PVI and PVII. Garner & Anderson (1981–82) had the intuitive idea, from their research findings, that the more text–bound, bottom–up readers may be more likely to note inconsistencies than the top–down readers who are more engaged in gaining a global view. If that were so, younger readers might, having by PV become more competent decoders than when in PIV be better at noticing wrong interpretations but less sure of themselves than the 'top–class' primary group who would scan more generally to get the gist and might pay less attention to details of individual words and phrases, taking them sometimes at face value.

Oakhill & Garnham (1989) thought that phonological coding might play an important part in comprehension as it would be a more lasting method of storing the earlier part of sentences to link with the following information. Younger readers, after the initial 'look–say' days of infant reading have passed, are still much more dependent on sounds when decoding, than older ones. Probably PVII tend to use more visual coding unless a very unfamiliar word appears when they have to work it out by sound – more or less as adults do when encountering

foreign surnames in the newspapers.

6.2.7 *REPRODUCTION*

By the top of the primary school, many children have learned that correct reproduction of textual fragments is a useful strategy which satisfies the demands of the exercise, and perhaps that is one reason for 'Reproduction' category errors at all stages. Where the correct parts of the texts have been selected as answers, no further enquiry is necessary. Only where mistakes have been made or phrases wrongly connected, are more questions asked. Younger readers may be likely to be less skilful at selecting the acceptable phrases and linking them, so record more errors. After PIV which produced more errors in this category, there was a levelling off of totals, with the other three classes varying only slightly. Meyer *et al.* (1980) thought that a collection of unrelated facts was caused by failure of the reader to follow the organisation of a passage. This inability would be more likely to be found in the youngest readers who produced more reproduction errors. The error totals were not significant.

6.2.8 *JUSTIFICATION*

The differences between age groups on the error frequencies they recorded in this category did reach significance level $p<0.001$. The reason was that children in PIV (aged 8) realised 16 errors whereas those in the other three classes (aged 9–11) recorded two or one. It seems that the youngest readers are much more likely to produce justification errors. As the definition of the category is "wrong explanations offered to reconcile apparently discrepant facts, due to misunderstanding of the given text", it would be expected that younger readers would have more errors of this type, because they would have more difficulty in understanding the text. Where they were aware of conflicting information which they believed they understood they would make more effort to justify their conclusions. To help them in this they are also more likely to call on their previous knowledge and introduce more extraneous items to fill gaps.

This finding is again supported by the work of Piaget (1926) who states that the idea of chance is absent from the younger child. He says that "when a child is asked the reason for something and does not know, he will always in some way invent an answer, so showing a desire to establish connections between the most varied objects". Piaget was referring to the period of egocentric thought which he considered to last to 7½ years, although he felt that the need for justifications lasted longer when concerned with verbal intelligence. A war scene complete with bombers as an interpretation of Rudyard Kipling's ruined jungle city (Fig. 16) seems to stem from such a strategy. Unable to extract from the text a reason for

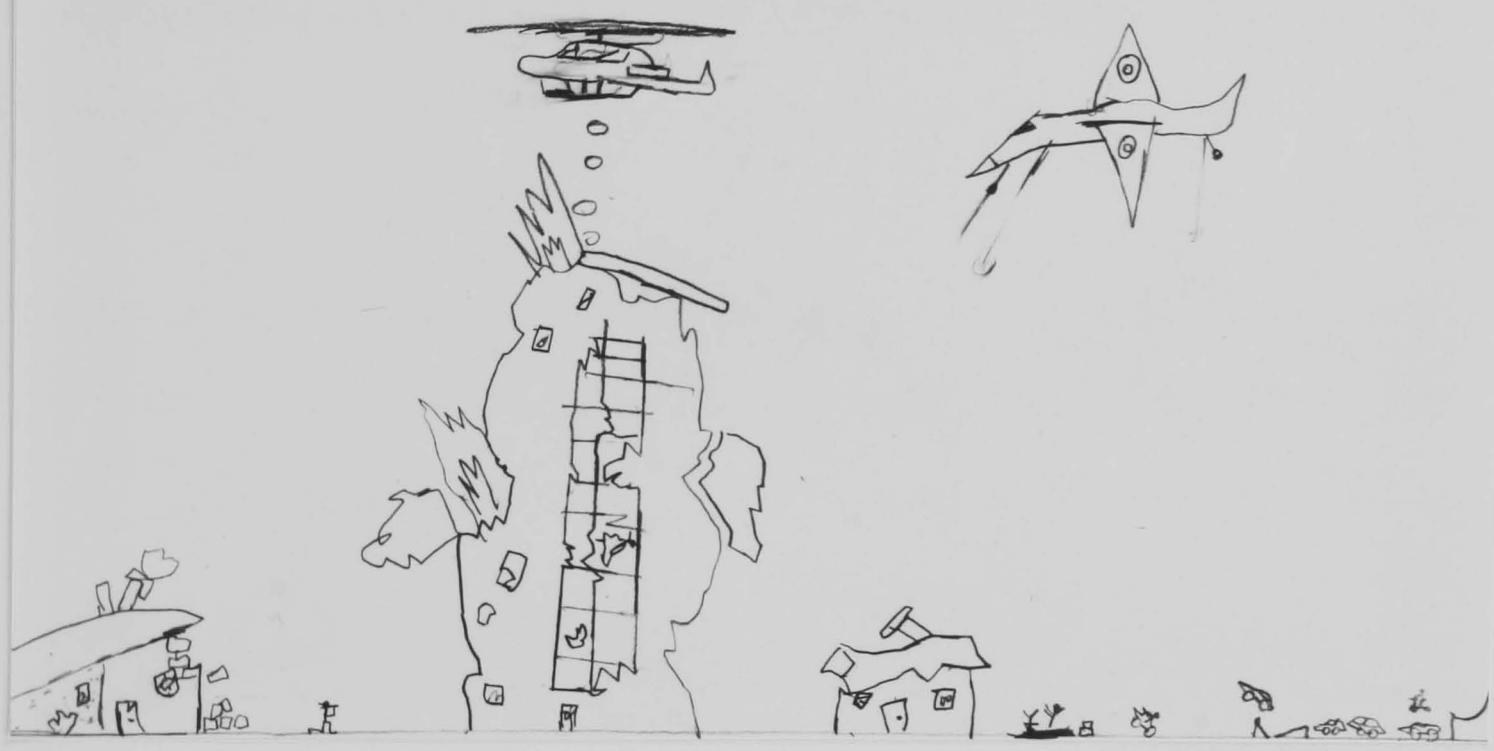

FIGURE 16

Justification: Bombers over ruined city as explanation of destruction.

the destruction, the reader explained the ruins in his own way. If reading purely for enjoyment such flights of fancy might not matter but they have serious implications for learning from text assigned for study purposes now or in the future. On the other hand younger readers may simply not have the necessary sense of historical time and set text in their own time as if written now for them.

Loman & Mayer (1983) write "apparently readers have developed schemata for stories which guide selection of information and organisation in memory". Possibly younger readers extract fragments of the text which call up relevant schemata according to their experience and expectancy. Responses could develop around these schemata which in turn could guide future selection from the text. For example, the shattered buildings mentioned in the City text could call to mind bombs and explosions, with which, through the media, present-day children are familiar, and thereafter warfare is adopted as the reason for destruction. Other textual information is presumably either ignored or forgotten.

Brown & Smiley (1977) working with second and seventh grade pupils in recall experiments found that intrusions were creative errors which manipulated pre-existing knowledge. This was certainly the case in errors found in the 'Justification' category.

6.2.9 *TRANSPOSITION*

The aforementioned pattern of higher total of errors in PIV with a drop then a

levelling off, rising slightly towards PVII was found in this category, possibly for the same suggested reasons – maturational change and general reading competence and experience. The differences were not significant, showing that the quantity of errors produced in this category was not greatly affected by age.

6.3 MODE OF PRESENTATION

As some categories of error were not relevant to some modes of presentation because that category could not be produced in the type of protocol used, there were 'nil' scores in several sections. The total error scores were therefore sometimes small so for purposes of overall analysis, the two writing mode scores were added together, as were both drawing modes.

The mode of presentation was found to be a highly significant factor in the number of errors made over the 10 selected categories, but by far the most errors were evident in the drawing modes (61.83%). The writing modes accounted for only 38.17%. As study of writing or of verbal reports (already mentioned as suspect for their dependability) is the usual method teachers use of assessing children's level of comprehension, it is clear that many misunderstandings must go undetected. Teacher expectation, especially as far as the more able pupils are concerned, probably contributes to this lack of detection because teachers do not expect the more generally competent children to have much problem with comprehension.

6.3.1 *FREE DRAWING AS A LEARNING OUTCOME IN COMPREHENSION TASKS*

Marjorie Siegel (1983) in research in a fourth grade classroom over a period of seven months wrote "asking students to draw their interpretations of stories and articles, admitted the possibility that some meanings would be communicated that would not be made public if language were the sole sign system used" (p.12). In order to draw what they thought the story meant or what they thought the article was trying to teach them, students had to reflect on what they had read and draw what experience brought to mind. Findings suggested that the children's interpretations were influenced by "their embedded theories of the social situation, their skill as artists and the nature of the activity of sketching". Siegel (1983) discovered that the pupils did not regard sketching as work. 'Work' was something assigned and graded by the teacher. Drawing was a more recreational, less assessed activity. In the present research, the illustrated assignments did not appear to be treated lightly but certainly some ideas found in them did not appear in the written answers. The conflict between the present interpretation of attitude and that of Siegel (1983) may be due to cultural differences. The possible effects of children's view of their tasks is also mentioned by Salomon (1984) who suggested that poor learning outcomes may not purely be the result of poor ability level, but may be due to the fact that the children do not see the work as worthy of much effort. They may see it as put forward by McClelland (1984) who thought that when faced with conflicting information or difficult concepts pupils may not be motivated to try to come to terms with the ideas because they do not

feel that the end would justify the effort.

In early education, children often draw pictures and teachers write the children's story captions until they can do it for themselves. The words follow the picture which has been generated by the pupils. Beyond the infant classes, illustrations related to text tend to disappear except in studies of novels or project work, when the situations are usually thoroughly discussed before the drawings are produced. Teachers, like children, form views about the values of certain activities, and may tend to see the illustration of texts to be an activity more applicable to infant classes. Unlike 'art' lessons, it may be considered more as a recreation or reward for diligent application to the preceding written task, than a worthwhile learning outcome in its own right. Teacher attitude could not have affected the drawing modes of presentation in this research, however, as all the tasks were introduced by the researcher.

Instructions to the subjects to draw the picture conjured up by the text, what Long *et al.* (1989) called "pictures in the mind" shows that the visual image arising from the same text, can be very different from reader to reader. Long *et al.* (1989) suggested that visual imaging is a natural part of the reading experience which helps to match the textual information to prior knowledge and so to aid comprehension. They also think that spontaneous imagery may be different from purposeful imagery following instructions – a point which is relevant in this research, where the readers were directed to draw what the text was about.

Sadoski *et al.* (1988) supported Paivio's (1971) dual coding theory that there is a parallel non–verbal dimension to discourse processing which can be analysed and which contributes to the overall comprehension, integration and appreciation of text. They suggest that this other dimension is imagination – that part of reading which makes the story come alive for the reader. They found that what was imagined by college students was very consistent with text, but was also frequently elaborated beyond the text. Details of what students saw or heard in their minds varied from person to person, was consistent with the text, but imported from outside. Steingart & Glock (1979) also working with college students found that instructions to image gave rise to greater inference making and this may be relevant to school children.

Sadoski (1983) supported Paivio's (1971) 'conceptual peg' theory and holds the view that key images act as mental 'pegs' to which associated information is attached for storage and subsequent retrieval. Scrutiny of the drawing protocols suggests that that is what many of the subjects have done. They appear to have latched on to certain words, such as 'feast', and to that attached their own experience of parties even to the extent of cakes and recorded music.

6.3.2 *WRITING AS A LEARNING OUTCOME IN COMPREHENSION TASKS*

Written answers are the most generally used method of checking on the comprehension of text of individual readers in this group of schools. Very often,

however, this work is done on worksheets where only words and phrases need to be filled in, by multiple choice format or cloze text. Answers involving the production of continuous text are not so often found. Report writing for project work and creative writing are presumed to develop that skill. In both of those, the material to record is provided from another source. In project work, the information comes from instruction, discussion and books which are often accessed and quoted verbatim. In creative writing, the topic is generally discussed, and the writing outcome derives from that combined with the child's imagination, previous knowledge and experience. Reading and learning from a passage of text and recording what it is about, is a different skill, but one on which much of the educational process depends throughout school and later life. The traditional popular comprehension exercises do not assess a pupil's ability to comprehend and assimilate the main gist of textual passages. As already mentioned, techniques of skimming and scanning can produce the word or sentence required for the response without understanding of the whole text.

Single word and sentence answers are, of course, much easier for a teacher to check than free recall responses, but they do not display miscomprehensions, to the same degree. Frederiksen (1975) argued that comparison of a subject's written recall and the textual input should indicate the comprehension processes that had been applied when reading. The free recall protocols in this research were not completely dependent on memory, as the text could be consulted but summaries of the texts should be likely to give a similar indication.

Summaries are not verbatim copies but the most important points of a passage linked to convey the 'gist' or 'bones' of it. Glenberg *et al.* (1987) saw this as a form of mental model constructed through the interaction of textual content and reader's knowledge. To learn from a text, some form of mental representation of it must be produced. Correct parroting and reproduction does not necessarily mean that the subject has properly assimilated the material.

6.3.3 *DIRECTED WRITING AND DRAWING AS LEARNING OUTCOMES IN COMPREHENSION TASKS*

For the directed activities, the texts were withdrawn so that the tasks depended on memory. It is not possible to usefully compare the error totals of free and directed activities, to study the effect of retention and withdrawal, as in the directed activities the opportunities for error were limited.

Paris & Upton (1976) found that the ability to remember semantic inferences improved across the 6–10 year old group and that the change did not appear to be entirely due to increased memory capacity. It was thought rather to be a strategy change in that younger subjects do not interrelate information from the texts in the same way as more mature readers. The study discovered a positive relationship between comprehension of inferences and memory for prose. Consequently subjects in whom this linking skill was less developed would be likely to make more errors in an assignment in which memory was a factor. The results for the directed activity in this research show the 8 year old subjects to make more errors

than the older ones in both presentation modes and less developed linking skills may be a contributing factor. There was little difference across the age range in the free drawing but the results for free writing showed more spread. In the latter activity the text was available for direct consultation but there was no picture given for similar reference. It would seem therefore that a memory factor would have been more likely to have affected the results of the drawing. That the free writing showed more developmental effect, lends further weight to the suggestion that linking skill rather than memory, may be the more important factor.

The purpose of the directed activities was not to test memories but to focus subject's attention on certain phrases which had been found in the pilot studies to be sources of frequent error but which some readers tended to omit in free response protocols. Omission does not necessarily mean misunderstanding but it could do so. It could also indicate the subject's assessment of centrality of information or tendency to concentrate on part of the text only. Whereas 'parroting' was confined, on average, to the earlier sections of texts, omissions appeared more in the final sections (Appendix 2, Table 35). This would suggest a serialistic rather than holistic approach to the tasks.

6.3.4 *INDIVIDUAL CATEGORIES SHOWING IMPORTANT EFFECTS OF PRESENTATION MODES*

6.3.4.1 Extraneous Items

There was little difference between the error totals for illustrated and written protocols. Cloze procedure (Taylor, 1953) is sometimes said to be based on the psychological concept of closure, in which the subject automatically supplies information missing from diagrams and drawings in order to see total structures. This may be a contributing cause of the addition of extraneous material which the reader feels should be there to complete the mental image they have constructed from the text. Anderson & Bower (1973) suggest that recalled data may be produced to 'fill in gaps' in the mental representation of the text. In a more controlled form of response this 'structure building' would not be evident.

6.3.4.2 Influence of Previous Knowledge

There were approximately three times more errors in the subjects' drawing than in their writing but it was divided between free and directed work. Mandler (1984) suggested that the addition of new material in recall was introduced to fill gaps which the reader discovered in recall of the surface structure. These gaps were bridged with material from established knowledge. As pupils were observed to refer little to the text after the first reading, both presentation modes in drawing may have been treated as memory exercises. Guilford (1959) argues that world

knowledge may largely be stored in the form of images and is supported by Paivio (1971) who feels that images are based on knowledge, experience and inference. Such images would influence the drawing protocols in this category.

6.3.4.3 Disregard of Stated Facts

Directed writing produced 61 examples in this category as compared to 31 in free writing but that may be partly a memory effect and not solely due to miscomprehension. The outstanding presentation effect was the large total of errors which occurred both in the free (257 errors) and in the directed (138 errors) drawing modes. As there were far more errors when the text was retained these errors were not much due to memory problems but possibly to disregard of the text. The target pupils did not both write and draw about the same text so each drawing was the sole response of a pupil to a text. Some appeared to be more flights of fancy than interpretation of text. Even if readers understand the topic of a text and more or less share the same background knowledge, however, they will still have a personal response because of their individual interests and feelings (Golden & Guthrie, 1986). The divergence from the original text displayed by some protocols did not bode well for the ability of some pupils to learn from text in the future. Spiro (1977) suggests that reconstructive errors can be the result of active elaboration as the reader tries to assimilate incoming information with existing schemata and this may lead to disregard of text when the reader has to reach the conclusions necessary for free recall responses. Another reason may be that of Siegel (1983) who felt that in drawing their version of a story, children

might display misunderstanding which would not be evident in written accounts and that their drawings were influenced by their theories about the social situation.

6.3.4.4 Literal Information

Lunzer & Gardner (1979) suggest that pupils may report text to be easy when they are unaware that they have misunderstood it. This may be a reason for taking the literal, on-surface meaning and failing to realise an alternative or deeper meaning. This literal information of the text shows up in free recall protocols when it might not be evident in another form of response.

The other categories either did not record error totals which were significant or they were significant only because of the fact that the categories did not allow for much error production in the drawing mode although the error totals in the writing mode were high enough to result in a chi-square registering significant differences.

6.4 ABILITY

Surprisingly, ability had no significant effect on the frequency of errors in categories suggesting that the below average and above average pupils are making the same types of error. This may be because of the manner in which the groups were selected. Rost (1989) argues that reading is a holistic skill. That would have implications for the testing of reading comprehension by some standardised tests as they tend to concentrate on separate or specific skills. Although whether skills

involved in comprehension can be identified and separated is a subject on which there is debate, the Primary Reading Test (France, 1979) had a strong emphasis on vocabulary which Andrich and Godfrey (1978) considered to be a specific factor in comprehension. Whereas the test served the purpose of matching pupils so that they could be allocated to groups, it perhaps did not place them in order of ability to understand continuous prose. Freebody & Anderson (1983) suggested that vocabulary was not the most important skill in comprehension, and a test which concentrated on understanding words in unconnected sentences may not have ordered pupils in relation to their ability to understand continuous prose.

Another possible reason for the lack of significant difference between the protocols of a group with standard score 90–99 in the Primary Reading Test and a group with standard score 101–110, was that of one or other group underachieving. As standardised tests are based on a normal distribution of ability there ought to be as many very high scorers as very low scorers. Learning support work would lead one to believe that there was a preponderance of low ability pupils and few really high achievers who need extra support in realising their potential. This observation suggests that pupils who can handle their class assignments without apparent difficulty may not be making full use of their abilities.

Some features of individual categories are of interest in their relation to ability. Oakhill (1982) found that poorer comprehenders had greater difficulty in integrating ideas than better comprehenders. This would indicate a form of surface or literal processing with failure to get the deeper meaning from the text and in the

'Literal information' category the below average group make 23 errors compared to the above average group who made 12 errors. This finding was further supported by Zabrucky & Moore (1989) who found that the ability to integrate was higher in the better readers of fourth, fifth and sixth grade.

The pupils of the above average group made 26 errors in the 'Extraneous items' category whereas the lower ability group made 63 errors. The S.E.D. Assessment of Achievement – English Language, team (1988), reported that poor readers at the PIV, PVII and secondary two stages all made many responses unrelated to the theme of the text. The poorer readers in this research also made 81 more errors in the 'Disregard of stated facts' category, 14 more errors in the 'Reproduction' category and 10 more in the 'Confusion of word meanings' category, than their counterparts. All of these totals would also suggest that a more superficial form of text processing was used by the less able pupils. The large number of errors recorded in the 'Influence of previous knowledge' category by the above average group when using the Feast and City texts suggests that they draw more on their previous knowledge but with some texts use it incorrectly.

6.5 LOCATION

Location had a significant effect on only one category of error – Influence of previous knowledge. As all the town children came from one intake area and school, the sample may have had less variation of background experience than the rural sample which covered three rural schools. The urban subjects formed

possibly a more heterogeneous group. Beers (1987) wrote, "empirical research demonstrates that readers form schemata according to social and environmental constraints, and readers who share social and environmental backgrounds, could be expected to share a good deal of conceptual knowledge in the form of similar but not identical schemata" (p. 375).

Results show that urban readers differed from rural ones mostly on four categories in these texts. These were 'Extraneous items', 'Confusion of word meanings', 'Disregard of stated facts' and 'Justification'. In the first two, the urban pupils made more errors than the rural ones.

The fact that only one of the differences between error totals in the ten categories was significant is perhaps because the rural group subjects all lived within 10 miles of the city and their environmental knowledge would not be tremendously different even if the sample was more varied. Rumelhart (1980) also recorded that similar schemata were likely to be held by readers who shared social and environmental backgrounds as they could be expected to share a fair amount of conceptual knowledge. Children living within a 10 mile radius of the city are familiar with it as their main shopping centre and venue for sporting activities and entertainment.

6.6 INTERACTIONS

After the effects of the five main variables of text, age, mode of presentation, ability and location the 10 selected categories of error were analysed, the

interactions between the variables were examined to find if any useful pointers towards particular strengths and difficulties could be located. Such interactions could be used when the improvement of reading comprehension of pupils in the classroom was considered. The first variables to be looked at in this way were age and ability as along with aptitude they are the main points to be considered in the provision of a suitable curriculum for each pupil in the classroom.

6.6.1 *INTERACTION OF AGE AND ABILITY*

The fact that there was no significant interaction effect between age and ability across a four year age spread of the above average ability groups suggest that the more able pupils in PVII were making the same types and numbers of errors with the same texts as PIV in the same ability group. In the below average ability group only two categories were significant, 'Disregard of stated facts' and 'Justification'. That is a worrying thought for primary teachers, as considerable development of comprehension skill would have been expected.

There was only a difference of one point 101/102 in error total in 'Influence of previous knowledge' category scores of the above and below average groups and only a spread of 5/6 between the totals of PIV and PVII in each. It would have been expected that both general knowledge and the ability to use it to construct inferences would have increased with age to a somewhat greater extent. It may be that although the older subjects have more general knowledge they do not draw upon it to help their interpretation because they do not see connections, or else it

is a confounding factor in that it becomes confused in processing, with the information in the text. Because of the tendency of the more able pupils in classrooms to develop a strategy of providing answers which satisfy the teacher, it is possible that they adhere quite closely to the text. The more able subjects did make fewer errors in the 'Disregard of stated facts' category than their counterparts. Although many researchers have mentioned developmental influences improving comprehension because of increased world knowledge, increased processing capacity, maturity etc, not one category of error in either ability group showed a reliable developmental effect, meaning that the quantity of errors in each category was not steadily decreasing with age, or with varying ability.

There were two categories, 'Disregard of stated facts' and 'Justification' which did show a significant effect in the below average group. In the latter category the class total which was out of line was that of PIV who produced 16 of the 18 errors recorded. This is supported by Piaget's (1926) statement, "childish thought and egocentric thought in general are perpetually determined by a need for justification at all costs" (p. 145). As the PIV above average group made no justification errors perhaps the more able pupils have more confidence in their abilities and do not feel it necessary to back up their answers, with explanations. The poorer readers, especially the younger two groups, made fewer discrimination errors than the older and higher ability subjects where PIV and PV and PVI and PVII are added together. Perhaps they take more care over individual words, being less sure of their decoding skill and reading in a more word by word, serialistic manner.

These findings would seem to indicate that as pupils progress through the top four primary classes those who are of slightly above or slightly below average ability, as measured by standardised tests (France, 1979) and follow a language curriculum supposedly suited to their age and ability, are not developing much in higher order reading skills but only in processing text to meet the assessment criteria in general use.

6.6.2 *INTERACTION OF AGE AND MODE OF PRESENTATION*

When mode of presentation was analysed to gauge its effect on categories of error, it was found to be a significant factor on eight categories out of the chosen ten. With each of the four modes i.e. free and directed writing and drawing was analysed separately in relation to age, only the directed writing mode showed any category with a significant relationship and that was in the 'Justification' category, where as already described, that error category was produced by the youngest classes. The directed writing protocol was a sentence completion task from memory where a choice had to be made from three given words. These prompts may have acted as 'pegs' round some of which the youngest subjects built plausible explanations, in the absence of clear memory of the text. Necessary textual information may not have been held in memory so another explanation may have been sought to fill gaps in the sentences.

The physical business of writing is less automatic in the younger subjects and consequently the production of their written protocols, more laborious. All

subjects had the same time limit to complete the tasks and the constraints of time, added to their greater writing and spelling difficulties, may have limited the responses of the younger readers. Spelling errors were not counted but as the pupils did not know that, they may have restrained themselves to words which they thought they could handle. In contrast, the older pupils appear in general to be more inhibited about drawing and their illustrations may have been influenced by what they thought they could draw. These factors could perhaps have narrowed the spread of errors across the age range.

6.6.3 *INTERACTION OF AGE AND TEXT*

As the working time was the same for each class, the younger children who take longer to write, may have presented less material and so have had less possibility of error. Results showed that in using the Dragon text, children in PVII made more errors on both written and illustrated protocols with little variation across categories. The Dragon text had the highest reading level. Primary IV made a total of 84 errors while primary VII totalled 88 errors in the same text.

An interesting result is the small variation in error total across the texts in the 'Disregard of stated facts' category, according to age. This indicates that readers, regardless of age, seemed unable to grasp what adults would generally assume to be the author's intended message – an important point for studying reading in secondary school. The greatest variation across the classes in this category was found in the Train text, which was the easiest (primary IV–48, primary V–40,

primary VI–32, primary VII–24). It would seem that with material of lower readability level there is a difference in the way the various age groups extract correct information from a text, but that when the text is more difficult there is little differentiation in the way it is handled by pupils of near average ability across a four year age range. When age was considered as a main effect on the grouped texts, PIV and PV did make significantly more errors in the 'Disregard of stated facts' category. The fact that Brown & Smiley (1977) found striking absence of developmental trend between child and adult in recall experiments, lends support to this finding as the directed tasks involved recall. They found that children from second–seventh grade, used the same basic pattern as had been previously found in adults. The only category to reach a significant difference in error totals was 'Justification' when the youngest pupils found more need to support their statements perhaps because of lack of confidence in handling the most difficult text – Dragon.

6.6.4 *INTERACTION OF AGE AND LOCATION*

There was only one significant relationship between the age of the urban subject and any category of error, and that was in the 'Extraneous items' category where the youngest group made 29 errors compared to the 26 made by the other three groups together. This pattern was not followed by the rural subjects in the same category so may be a location effect. Brown & Smiley (1977) found that intrusions in recall were creative errors, manipulating pre–existing knowledge, while Schank & Abelson (1977) pointed out the part played by expectation in encoding and memory. It may be that these influences affected the error total of

PIV in the 'Extraneous items' category as the errors tended to be linked to previous knowledge of city life e.g. multi-storey flats and supermarkets. This age group did produce more justifications of their statements than the other three classes.

The analyses of the error totals of the rural subjects discovered two categories showing a significant relationship between age and location. These were 'Disregard of stated facts' and 'Justification'. Because PIV made more errors in these categories than the older pupils the result was probably more due to the age factor than to location.

The errors in the 'Disregard of stated facts' category were not clearly developmental in origin and may be due to location as they did not show a significant interaction in the group of urban subjects. The PVII pupils in the rural groups did not make so many errors in this category (46) as the other, 65, 76 and 58. Murray (1988) found children's memories to give priority to fairly general schematic memories but felt that older children might devote more effort to details during encoding. In that case they might pay slightly more attention to the facts actually presented in the text. Generally pupils tended to handle the tasks as recall assignments, making little obvious effort to check the text for information after the first reading.

As already stated, age would be expected to be a significant factor in error totals across a four year age range, but although it may affect urban and rural pupils slightly differently it had over all surprisingly little effect. The fact that in the

significant categories the totals of the two younger classes considerably exceeds that of the two older ones suggests a very slight developmental effect beginning a little earlier with the rural pupils.

6.6.5 *INTERACTION OF TEXT AND ABILITY*

Although the lower ability group ranged from reading quotient 90–99 and the higher ability group from 101–110, so that both groups were fairly close to the average, and no disabled or extremely able readers could have an effect on the results, there was a difference of 171 in the total errors made by the groups. The pupils in the higher ability group made fewer errors in every category. An interesting point is that there was a difference of only one point in the total of errors in the category of 'Influence of previous knowledge' – 102/101. This category showed little connection between readability level of texts and subject ability in both achievement groups giving a particularly high chi–square in the case of the above average pupils. There was no marked error trend from easiest to most difficult text. There was a large difference in the number of errors arising in this category with the Feast text showing most influence. It would seem that the more able pupils drew to a greater extent on previous knowledge and did not always use it correctly. It is possible that they had more general knowledge on which to draw. Both groups were influenced by their personal knowledge of feasts which conflicted with the description of the Viking celebration. The familiar often took precedence over the unfamiliar giving rise to, for example, Astrid using a modern cooker. Chou *et al.* (1989) found that even college students formed wrong

constructions because of topic familiarity.

The factors of text and ability appeared to have considerable effect on the categories of error, only three, 'Literal information', 'Reproduction' and 'Justification', having no significant relationship in either ability group. Although seven categories reached significance level in the below average group errors and only four in the upper group, the latter always had higher chi-squares for the four categories they had in common. The categories of 'Influence of previous knowledge', 'Confusion of word meaning', 'Disregard of stated facts' and 'Transposition', were always higher for the more able group. As ability had little overall effect it may be that other factors such as attitude, interest or affective response gave rise to the greater differentiation of the upper group's interactions with the texts. Sadoski *et al.* (1988) suggest that this personal response to text is imagination – 'that part of reading which makes stories come to life for us'.

The other interesting difference between the groups is that the below average group made more errors in the combined categories of 'Confusion of word meanings' and 'Discrimination errors'. These are both closely linked to individual printed words and perhaps the below average pupils still at this stage of their education experience more problems with decoding or reading technique such as failing to read beyond the problem word to gain context clues to meaning. When the problem is not realised a plausible construction is sometimes built round the story.

6.6.6 *INTERACTION OF MODE OF PRESENTATION AND ABILITY*

This interaction had very significant effects on most categories of error with only two categories – 'Predominance of stereotypes' and 'Influence of previous knowledge' – failing to reach significance level in the higher ability group and only the former not doing so with the lower ability group.

Possibly because of natural ability to form images and the potential of images as prompts for inferences, children of both ability groups produced many errors in the 'Extraneous items' and 'Disregard for stated facts' categories because they departed from the message of the printed text to engage in personal constructions in drawing tasks.

The personal response to reading is an important aspect of the task and it is obvious to those who have seen the film of a book they have read, that all do not form exactly the same images from text. Golden & Guthrie (1986), discussing reader's response to literature, query whether meaning is in the text or in the reader who projects his personality on to the text and decide that it exists somewhere between the two. What is important in the educational process is that pupils can extract the essential information from that text and not be way–laid into irrelevant flights of fancy.

The four presentation modes had varied effects on the error categories but not much on the ability group unless the fact that fewer categories were significant for

the higher ability group indicates that they show less variation in their mistakes, or that they are better at disguising misunderstandings.

In overall totals the above average group made fewer errors in each mode except the directed drawing where they made many more errors in 'Disregard of stated facts' category. This is an important finding as it suggests that the more able pupils tend to pay less attention to the textual message, not what teachers would expect to happen. Teachers must be aware that the task they set can influence the amount of errors made and misunderstanding displayed.

6.6.7 *INTERACTION OF LOCATION AND ABILITY*

Although location was overall of small significance as a factor of the error totals, there were small differences in the way the two ability groups recorded errors in categories. Following on from the previous discussion, the large numbers of errors which were made in the 'Disregard of stated facts' category by the higher ability pupils were mostly made by the rural group whereas of these produced in this category by the lower group, more were made by the urban pupils. Of the other two categories which showed a significant relationship, 'Reproduction' and 'Justification', there was another reversal. The above average rural subjects made fewest errors in this category while in the below average subjects, it was the urban subjects who produced fewest errors.

As neither ability nor location were found to have great influence on the error pattern it seems that those significant relationships found may be attributable less to them than to some external factor such as interest level of material for the different environmental groups. Such a reason for the differential handling of the material would emphasise the need for teachers to take the interests of the pupils into consideration when choosing texts.

6.6.8 *INTERACTION OF MODE OF PRESENTATION AND TEXT*

On their own, both mode of presentation and text were found to be significant factors and it is notable that they are both under teacher control whereas the factors brought to the reading situation by the child i.e. age, ability and location appear to have much less influence on the errors recorded. Moreover, the former factors can be manipulated while the latter are fixed in the classroom situation at any particular lesson time. Given that the existence of individual differences in ability and potential are well recognised in education one might expect that age and ability would have considerable effect on the number and type of error made. The fact that mode of presentation and text can be manipulated to produce such varied results suggests that comprehension assessment, unless very varied, may give rise to unfounded complacency regarding the progress of the pupils. A satisfactory formula by which the pupil can produce the answer the teacher expects may be unwittingly arrived at and adhered to. Unless different methods of responding are required of pupils, inadequacy of comprehension may remain undetected.

The number of categories in which differences between modes of presentation reached significance level varied from text to text but more or less in proportion to the reading level of the material, with the more difficult texts showing most effect. The City text showed every category to be significant while the Dragon text showed eight significant categories. In contrast, the Train text, the easiest one, gave rise to only two. The categories which were not relevant to certain modes and gave scores of nil, contributed to the variation of the totals and therefore to the chi-square levels, realised for each text.

One of the interesting findings is that in the three most difficult texts there were comparatively few examples of 'Disregard of stated facts' in the writing modes and high totals in the drawing modes. The most striking example was the six recorded for the writing modes while the drawing modes totalled 164 in the Dragon text. In a classroom situation such written work would appear to display pupils' understanding while the drawing protocols revealed the opposite. As the texts became easier, the numbers evened out until in the Train text the writing total in this category was 70 and the drawing total was 74.

In the main study subjects tackled either the writing or drawing tasks so they did not illustrate the text about which they had just written. Possibly the instruction to draw increased the quantity of visual images conjured up by the text, and illustrations showed personal differences in imaging ability. Bartlett (1932) wrote that the principles of the combination of images, have their own peculiarities and result in constructions which are relatively wild, jerky and irregular, compared with

the straightforward unwinding of a habit, or with the somewhat orderly march of thought. This description could perhaps partly explain the discrepancy between the writing and drawing error scores. When the text was more difficult to understand, the readers, while carefully selecting parts of the text to write may have drawn heavily on images prompted by fragments of print in the drawing tasks. It would seem that as the text became easier to understand, some of the processing energy now required to wrestle with the extraction of meaning was perhaps used to embellish the summary. These flights of fancy and personal interpretations would not be obvious in the written task since that is not open-ended, but because of the difficulty of scoring free responses many comprehension tasks are in the form of cloze texts, direct answers to questions, or multiple choice.

Another category which showed an interesting pattern of results, was 'Influence of previous knowledge'. In the easiest Train passage it was not significant. Although significant for the Dragon text it did not record such a high chi-square as the City and Feast texts, probably because previous knowledge of dragons would depend on experience of literature. What appeared to happen with the City and Feast texts which were neither the hardest or easiest, was a misapplication of the setting. Minsky (1975) described his "frame" as "a remembered framework to be adapted to fit reality by changing details as necessary", in his theory of how knowledge may be represented in memory. It may be that the subjects used a 'frame' of 'City' or 'Feast' constructed from their previous experience when producing the protocols. The types of buildings and meals produced by some subjects lent support to that suggestion.

Notable was the fact that so many completely failed to realise that the descriptions given in the texts were completely different from the 'frames' they held in memory. Zabrucky & Ratner (1985) found that children of third and sixth grades are unskilled at comprehension monitoring tasks i.e. spotting errors and inconsistencies, regardless of age or reading ability. These factors did not come into this text/presentation analysis, but treating the subjects as a group, they were relatively unsuccessful in noting the discrepancies between textual information and personal experience in the situations where they could draw upon the latter. Variations in text presentation highlighted this, especially in the more difficult texts when these could be related to previous knowledge.

Overall there was a correlation trend between the level of difficulty of text and mode of presentation of comprehension task, but it could be affected by the individual characteristics of specific texts, for example their imaginary content.

These findings are important for classroom teaching as assessment methods used for comprehension can obviously affect the results recorded. With the current move towards on-going assessment of pupils as they handle daily assignments, this possibility is one of which teachers should be aware. Advantages of ongoing assessment are that it is less artificial than tests and saves time but a variety of methods should be used to gain the truest estimate of ability.

6.6.9 *INTERACTION OF TEXT AND LOCATION*

Analysis of this interaction disclosed a considerable relationship with five categories reaching significance level in the urban sample and eight in the rural sample. As location was not a very significant influence on the category system of errors on its own, it is likely that the main effect came from the text which has been found to be an important factor.

Urban pupils made more errors than rural ones on each text, but the greatest location effects were displayed in the results for the Train and City texts. On the two subjects on which urban readers might be expected to be most knowledgeable, they differed most in the error totals they recorded and these errors were distributed across 10 categories. Bransford & Johnson (1972) concluded that prior knowledge of a situation did not guarantee its usefulness for comprehension, and these present results lend support to that conclusion.

Prior familiarity of textual topic may lead to confusion between knowledge stored in memory and information presented in the text. Without careful checking of the print, it may be difficult when making a response to separate the two.

Although a small location effect may be due to sampling rather than environment this relationship between textual content and location of subjects is worthy of note. It is perhaps erroneous to assume that 'country' texts are best understood by

'country' children, although for comprehension to take place a reader must have suitable established schemata into which incoming information can be assimilated.

6.6.10 *INTERACTION BETWEEN LOCATION AND MODE OF PRESENTATION*

There would appear to be a considerable relationship between location and mode of presentation as all categories showed significant differences in the rural group results and only one, 'Predominance of stereotypes', did not show a significant difference in the category totals of the urban group. As there is so little difference in the patterns of results over both locations, it seems that, as already found in analysis, mode of presentation has the major influence on the chi-square results. Also as mentioned elsewhere, nil results when certain categories could not yield errors because of task demands, affect the spread of results.

The location effect was probably due to only slight variation in the way material was handled by the two groups. The only effects of location which appeared to influence results was that, in free drawing, some errors such as high-rise flats, playgrounds in parks, and supermarkets, only appeared in the urban protocols. This shows that the child's world knowledge and personal experience are integral parts of his comprehension of text, and used to construct plausible meanings for it. The large numbers of errors found in the 'Disregard of stated facts' category in the research shows that such constructions frequently take precedence over the information presented in the texts.

The particular effects of presentation mode have been discussed earlier (p. 296).

6.6.11 *CONCLUSIONS*

This research, although intended to examine causes or characteristics of certain types of comprehension problem in some children, actually reveals a general problem. Once the basic skills have been established, comprehension skills do not appear to be developing as much as expected over the next few years in the near average ability groups, although there is a decrease in error totals from PIV–PVII. Although there is an increase in the quantity of comprehension work set by class teachers as pupils progress towards the top of the primary school, there does not seem to be a parallel increase in quality as the same types of errors are being made.

Scottish Education Department reports on Assessment of Achievement in English Language (SED, 1988) and Science (SED, 1990) have both noted a pervading lack of development in many pupils right into second year secondary school. Methods of assessment in classroom use frequently fail to disclose this problem because pupils have developed strategies for answering questions correctly without fully understanding the material and are therefore allowed to progress through increasingly complex texts without it being disclosed. As so much of educational progress depends on a pupil's ability to learn from text, this finding is a matter for serious concern.

Of the five variables tested for their effects on comprehension, text, mode of presentation of response, age, ability and location, by far the greatest effects were due to text and mode of presentation, and comparatively little effect was due to age and ability which are major aspects of child development, and ones on which teachers base their differential instruction. Simpson (1989) reporting recently on a research project on differentiation, implemented by Northern College, Aberdeen, noted that although instruction material was well matched to the ability of average and below average pupils, those at the upper end of the scale were not being sufficiently challenged in their work. Although the most able pupils did not form part of the experimental group in this present research, the finding may also apply to the pupils at the extreme of the upper ability group. As competence in comprehension does not always seem to be developing in proportion to ability level as measured by standardised test (France, 1979) it also does not seem to be developing over four years of schooling. The reasons may be the same. Research carried out by Zabrucky & Moore (1989) with poor, average and good readers in fourth, fifth and sixth grades, i.e. aged from 10–12 years, found the ability to integrate textual information with prior knowledge to be developed fairly early in pupils with limited reading skills. If these skills are sufficiently established by Primary IV to cope with the demands of the comprehension tasks usually presented, perhaps this is the reason why more or greater skills are frequently not developing across the following three years of primary schooling. With age increase pupils will be able to handle larger portions of text with more complicated words and longer sentences as decoding skill and memory capacity improve (Paris & Upton, 1976). If ability to answer questions in comprehension only requires

ability to deal with longer words and sentences, pupils may appear to be understanding while merely developing the ability to manipulate surface characteristics of text. Pupils may not be required to develop higher order reading skills such as evaluation because of methods of assessment used. Free response protocols in writing and drawing can reveal these deficiencies.

That location made minor difference to the way in which pupils handled text was not unexpected in an area which was geographically quite small and where the environments were not very substantially different. Moreover it lay within one regional authority area and so provision in teacher and material resource terms might be assumed to be similar.

The major effects on the category system were made by text and mode of presentation. These are both factors which can be manipulated by the teacher, and fall in the realm of materials and methods. The type and reading levels of texts presented to pupils for comprehension purposes greatly influenced the results achieved. The group of texts selected covered almost a six year spread in reading level as assessed by Fog and Fry Readability Formulae so that they should have been very easy for some pupils and very difficult for others, but although the number of errors made was related to the difficulty of the texts in reading level terms the effect of age over four texts was significant on only one category of error on the Dragon text.

Reading age is the factor by which teachers generally select material for pupils and also a guiding principle in the compilation of class text books on which the language curriculum is usually based. Although the overall error frequencies were related to reading level of text as measured by Fog and Fry Readability Formulae individual categories did not consistently show this relationship in their error frequency totals so the effect must come from another factor within the texts.

The texts were matched as closely as possible by propositional analyses (Kintsch *et al.*, 1975) which measure semantic complexity. Therefore textual structure should not have contributed much to differences in error totals even though the system concentrates more on syntactic than semantic dimensions. The Dragon text is more semantically complex than the others. It has a more poetic register e.g. "had never yet come home to him", and "red–stained in the light", and perhaps more potential for visual imagery than the other texts. Although image formation is highly personal in nature (Paivio, 1969), the vivid descriptions in this text may have been a factor in the error differential across categories. The other descriptive text, the City, is in a more straight forward style of writing.

The cohesive links also appear more complex in the Dragon text, with anaphoric ties stretching over three sentences e.g. "he lay" ---- "Smaug lay". Although it basically describes the dragon, the text also introduces another subject – Bilbo – which adds to the complexity of the cohesive ties (Halliday & Hasan, 1976). If the readers fail to understand the linking pronouns they would be more likely to process the passage in a sentence by sentence manner rather than to absorb the

meaning of the paragraph as a whole. Unless the reader was familiar with the characters in *The Hobbit*, the character names do not convey much information to help distinguish human from animal. These factors may contribute to the Dragon text having more errors than the other texts in the broad categories of surface reading ('Justification' and 'Transposition') and effort after meaning ('Justification' and 'Transposition') because the pupils would be likely to have most difficulty in uncovering its deeper meaning.

The interest level of the text for the readers is another important factor in the pupil–material match which may have affected the error distribution. The topics varied from the imaginary through the geographical to the historical and the personal preferences of the pupils for such themes together with the previous reading experience and general knowledge which they brought to the reading tasks, would be likely to affect their individual responses. Propositional analysis measures only the textual content and makes no allowances for previous knowledge.

People are more motivated to attend to texts which they find interesting and those would be unlikely to be the same for each reader. Moreover it is easier to understand incoming information which can be assimilated to knowledge already stored as schemata (Collins & Quillian, 1972). With the subjects drawn from four age groups across five schools, there would bound to be considerable differences in the knowledge stored in pupil memory, and the interest with which they attended to individual texts. Perhaps that factor contributes to the considerable

variation in error totals across the three child-centred categories of 'Extraneous items', 'Predominance of stereotypes', and 'Influence of previous knowledge'. The Dragon about which children would perhaps have more limited knowledge had fewest errors in the latter category.

The broad category most likely to be affected by the reading level of the individual texts is surface reading when the printed words may be taken at face value ('Literal interpretation' and 'Reproduction') when sections which are difficult to understand may simply be reproduced verbatim. These two categories are correlated with reading level.

Text-centred error totals would possibly be most affected by particular words and phrases which might have more than one meaning or connotation for pupils ('Confusion of word meaning'), be misread ('Discrimination errors'), or merely omitted ('Disregard of stated facts'). The considerable variation in the error totals in these categories may partly be for that reason.

The other major variable under teacher control was mode of presentation. In this study the drawing protocols produced a different range and quantity of errors from the writing protocols but drawing in the upper primary classes is not generally used for comprehension responses. Graphs, tables and diagrammatic outcomes which are frequently found, are more prescriptive and require different skills from that involved in free drawing. Lack of variety of response type possibly masks much miscomprehension amongst pupils and the findings of this research suggest that

free response summaries in writing and drawing give a different indication of pupils' comprehension skill from the methods more generally in use. This finding is also of importance for teachers and text book writers, especially those involved with the upper primary classes.

Vernon (1962) who conducted studies with British and American college students to determine the factors affecting reading comprehension, also found that response mode affected the results of tests. Moreover, he found students to develop through practice, an important element of 'know–how' (p. 284) in handling typical reading tests. That finding parallels the 'coping' strategies suggested in this present study, to be developed by pupils in answering questions on texts.

Vernon concluded that although content factors have a stronger influence than method factors on the results of comprehension tests given to college students, the effects of variation in response format would be worth further investigation. He argued particularly for the use of creative (free) responses in writing as he found that those did not involve a different ability from that involved in writing answers to questions on text or recording answers to multiple choice tests, but that they affected results in that they are less subject to practice effects and more open–ended.

Another finding of this study is that the errors pupils make in comprehension can mostly be grouped into categories in a system which applies over differing texts, presentation modes, age and ability groups and school environments. Given that

certain categories of errors can be reasonably reliably isolated by teachers, this finding could be of considerable educational use. If aware of possible source and reasons for errors, teachers and pupils could work together at eliminating individual types, instead of regarding each comprehension error as an unrelated fact. Possible ways of using the category system as a teaching tool and implications for educational practice in comprehension development are discussed in the next chapter.

CHAPTER 7

Implications for Classroom Practice and Curriculum Development

7.1 RELEVANCE OF CATEGORY SYSTEM

This thesis developed from a classroom problem and the findings are relevant to classroom practice. This chapter points out the teaching implications arising from the practical research and suggests ways in which teachers might make use of the findings in their classrooms.

The ideas for teaching are based on the classification by teachers of the comprehension errors their children make in class assignments. Suggestions are made as to how these classifications could be used as a basis for instruction to promote better comprehension. Details are given of a follow-up study in which this method was used with a group of poor comprehenders and the compatibility of the system with current developments in Scottish education is explained. Support for the category system of errors is given by examples of miscomprehension collected from other sources. This chapter summarises the findings of this research and raises questions for future study.

Apart from the errors of specific interest which have already been mentioned in this research, during learning support work and from interested teachers others have been collected, some of which provide salient lessons for educators. As previously explained, the term 'error' was taken to mean a divergence from the reasonable interpretation of the given text and not necessarily an answer which was completely 'wrong'. Many errors suggested elaborate constructivist activity which might have taken place in the minds of the readers.

7.2 PROBLEMS OF ORAL AND WRITTEN LANGUAGE

It is perhaps too readily assumed that pupils understand the language whether of classroom instruction or of, for example, the schools' television broadcasts, when it is presented orally. However errors arise from miscomprehension of spoken language as well as from failure to understand the written word.

In direct oral communication in the classroom, the teacher and pupil share both a common setting and knowledge of previous oral interactions. A listener can pick up additional information to aid understanding of the spoken word. Information is conveyed in facial expression and body language as well as by auditory clues to help interpretation and radio broadcasts convey auditory information to help the pupil arrive at meaning. With technological methods of transmitting information, the interactive aspect of communication is missing although the advent of interactive video as a teaching aid is projected. Presenters on television, radio and video do not share the same setting as the listening pupils and may speak from a social context foreign to them.

Writers of text similarly can only guess at pupils' previous knowledge and environmental situation. They must gauge the amount of information which must be conveyed to enable readers to comprehend the written message, and it must be presented in a manner which makes it possible for them to build up an ordered mental representation of the gist of the text. It is important for teachers to remember when wrestling with pupils' miscomprehensions of written text that they

may also hold unrevealed miscomprehensions of spoken material.

7.3 SUPPORT FOR THE CATEGORY SYSTEM

Support for the category system of error classification worked out in this thesis was found in the work of Moyle (1982). In a chapter on diagnostic teaching which includes transcripts of children's oral discussion of text and examples of drawing outcomes (modelling) demonstrating the gist of the text, many errors are presented which fit into categories of error presented in the present thesis.

Further support was found in extracts from answers offered in the Scottish Education Department's Assessment of Science Survey and published in *The Scotsman* newspaper (7 February 1990). They too could be allocated to the categories developed in this thesis and were derived from pupils at Primary IV, primary VII and secondary II stages. With national testing shortly to focus on pupils at these levels of education, the types of errors they produced and their possible sources are of special interest to teachers. The following errors collected from these sources are classified as follows:

Attributions: CW – "Children's Words" (Moyle, 1982).

SS – Article in *The Scotsman* based on the Scottish Education Department's Report Assessment of Achievement in Science.

OT - Collected in schools during class work, and from other teachers.

7.3.1 *CATEGORY 3 - INFLUENCE OF PREVIOUS KNOWLEDGE*

a. Drawing of Mary Queen of Scots' *flight* from Loch Leven Castle showing her departing by helicopter. OT

b. Why do six-year-olds lose their milk teeth? "The teeth she lost .... were her milk teeth, like foster mothers or temporary teachers they are only for a short while until stationary or correct ones come". SS

c. *Identify* differences between two different kinds of beetle. "Their faces are cute and some are ugly". cf. Identification parades when faces are scrutinised. SS

d. Why do people kill animals? "Because they are ill". This was not one of the reasons given in the passage but may have had personal significance because of, for example, the death of a pet. CW

7.3.2 *CATEGORY 4 - CONFUSION OF WORD MEANINGS*

e. By how much is .... greater than ....? "It must be an adding sum because greater means bigger, doesn't it?" OT

f. "There were farms on the plains". Plain was firstly explained as 'aeroplane' and then as unflavoured e.g. 'plain crisps', although neither fitted the context.

g. "The water vapour condenses". It gets smaller.

h. A basket decorated with *flags* when in fact the word referred to "irises". OT

i. Asked to say whether a drawing of a *cell* was an animal or a plant. "I think it is a cell wall because there has got to be a cell wall to keep the plant in the pot". "This is a cell wall and you don't put animals into a cell at any time". *Cell* was apparently taken to mean 'prison'. SS

j. "Mungo Park was a recreation ground". cf. McDiarmid Park – a local football ground.

k. 'Bandit' and 'trio' have both been explained as biscuits although in the texts, the 'bandit' was hiding up a tree and the 'trio' referred to three girls.

7.3.3 *CATEGORY 5 – DISCRIMINATION ERRORS*

l. 'Clover' read as 'cloths' suggests auditory discrimination of 'v/th'. A possible speech problem may have resulted in wrong sub–vocalisation of the word.

m. In a question about electrostatic charge, "If it is positive it attracts – if it is negative it rebels". Confusion between 'repels' and 'rebels'. SS

n. 'Draw a hamburger on a roll' produced a 'hammer' on a roll. Children appear rarely to question apparently strange instructions. OT

o. The word 'All' read as "A eleven" possible based on previous knowledge of road numbers.

7.3.4 *CATEGORY 6 - DISREGARD OF STATED FACTS*

p. Drawing of new moon when the text read "dimly lit by the dying moon". CW

7.3.5 *CATEGORY 7 - LITERAL COMPREHENSION*

q. The instruction "Stop at the station *below*", in teaching division resulted in higher multiples than the targets being selected as they were in a *lower* position when multiplication tables were written out in a conventional manner. OT

r. A slit on the jacket sleeve of a paratrooper's jacket was drawn when the 'sleeve' was actually in a panel of the parachute. CW

7.3.6 *CATEGORY 9 - JUSTIFICATION*

s. With reference to beetles, "It is a man and men catch food so he has to be quick". SS

t. "All insects can't be the same .... you would call a bee a dragonfly if they were the same". SS

7.3.7 *CATEGORY 10 - TRANSPOSITION*

u. "Windows all round it" transposed to 'round windows'. OT

7.4 DISCUSSION OF ERRORS

Study of those errors quoted from other sources, raises the question of the acceptability of answers and when an answer should be considered correct or incorrect by the marker. Decisions must be made between the relative claims of reproduced material previously taught or presented in text and the production of information gained from previous experience, as answers. In a study of communication differences between literates and non-literates in the Vai tribe in Liberia, Scribner and Cole (1981) discuss the problem of the different criteria by which Western psychologists and Vai literates may evaluate 'good communication'. The members of the Vai tribe communicate in terms of what they know from their lifestyle, environment and tradition. Children have to base their interpretations on the knowledge they have absorbed from personal experience and previous teaching. There may be discrepancies due to maturity, experience, command of literacy and cultural background between criteria used by teacher and pupil to judge what constitutes an acceptable explanation or answer. Scribner & Cole argue that western education places great emphasis on textual content and much less on extra-textual inference and relevance. An example of this is in error (b) where the question of why the assessors did not consider the child's explanation about the loss of milk teeth to be acceptable, is raised.

Support for the logical basis for many errors and the desirability of varied response protocols, was found in the Scottish Council for Research in Education (1991) Spring Newsletter in a report on *Developing Ideas in Science* by Wynne Harlen, p. 3. She wrote, "many of the children's ideas are revealed not from their writing but in their drawings and commentaries on them. It is clear that there is a certain logic in the children's ideas. Children use a naive form of reasoning and come up with ideas which seem to them to fit their limited experience and satisfy their urge to explain things for the present time".

7.5 FOLLOW-UP STUDY

A follow-up study was done during two school terms, a period which, allowing for holidays, covered seven months. The subjects were nine Primary VI pupils who had registered low scores on a class screening test using Primary Reading Test – Level 1 (France, 1979). All had scored two-three years below their chronological age. This group was a natural sample taught usually twice a week for half-hour periods, as part of a learning support programme. There was no control group as the study was part of on-going differentiated class work.

With the aim of helping these pupils to better understanding of text, excerpts were chosen from school text books and those found on classroom shelves. The excerpts were from 120–150 words long, were presented without alteration, and included narrative and informational material. In the initial stages, each pupil had to read the passage silently, write 40–50 words summary expressing the content

and draw a picture showing what the excerpt was about. This resulted in a large amount of reproduction. On one occasion all wrote "David Livingstone was a missionary" and it subsequently transpired that not one of the group knew what a missionary did.

The next emphasis was on dictionary work when the meanings of a few of the more difficult words in the passage were looked up and written out before the summary was attempted. The purpose was to replace the reproduction by pupils' own words. When "Mary Queen of Scots formed a fighting team", was found in a summary as an alternative to "formed an army" it was obvious that the message had been taken, perhaps too much to heart. This attention to vocabulary was based on the research of Wixson (1986) who, working with fifth grade pupils, found that pre-taught vocabulary enhanced understanding of story ideas, although it could not be established if looking up a word (dictionary method) or deriving meaning from examples (concept method), was better. Beck *et al.* (1982) also advocated the advantages of vocabulary instruction for fourth grade pupils as an aid to comprehension although whether the improvement came from increased speed of lexical access or from enriched connections in readers' semantic networks, was not established. During the second teaching slot each week, the corrected work was discussed and probable reasons for errors considered. Questions were used to encourage the pupils to think about their work e.g. "Was that information given in the text?" ('Extraneous items' and 'Disregard of stated facts'). "Was the word mis-read or given the wrong meaning for the passage?" ('Discrimination errors' and 'Confusion of word meanings'). "Where did a certain word actually appear in the

text?" ('Transposition'). Where errors could be linked to categories their possible source was pointed out so that the pupils could perhaps see where they had gone wrong. The complete category system was not, of course, mentioned to the pupils but only the types of errors they had made.

The third line of attack was on main ideas – the gist of the passage. Pupils underlined the most important sentences and based their summaries on those. Through discussion, attention was thereby drawn to what was the main story line and what was the extra detail in the passage. Brown, Day & Jones (1983) noted that summarisation was the ability to condense gist and that it was important for understanding text. The pupils, even with the text to hand, tended merely to note presented facts without assessment of their importance, and needed practice in identifying the main ideas. Doctorow *et al.* (1978) thought that the question of summary statements led to deeper processing of text and therefore to greater understanding.

Durkin (1979) studying third–sixth grades found that less than 1% of instructional time was spent in comprehension instruction while Wendler *et al.* (1989) studying effective practices for teaching comprehension found that the amount of time spent on the task as well as guided practice, feed–back and group instruction all correlated with gains in reading achievement. Time–on–target was therefore seen to be essential in trying to improve the reading comprehension of this group of pupils.

After seven months of concentrated attention by the follow-up group of subjects in this present study on text, vocabulary development, isolation of main facts and discussion of errors based on the 10 categories, they were retested using Primary Reading Test Form 1A (France, 1979). The scores were recorded as reading ages. In an average reader, reading age and chronological age would be equal. Scoring revealed an average increase of 1.3 years in reading age in what was basically a comprehension test even though it involved only individual sentences, and not continuous prose. It is obvious that not all the increase was due to the teaching programme as it occupied only about an hour of weekly class time. A gain of seven months would have been expected from maturation alone. Those pupils had a considerable gap to close between reading age and chronological age, and in such situations it is perhaps easier to accelerate over a few months. In any retest situation, also, there is a tendency towards regression to the mean. Moreover this study took place over the two main teaching terms of autumn and spring when the bulk of the session's curriculum is covered. Class teacher attention and general language work also played a part in this increase in reading age.

When allowance was made for the expected gain in reading age over the time of the follow-up study the results were significant $p<0.01$ (Wilcoxon matched pairs test). Overall, therefore, it seems that the comprehension skills of low-achievers can be considerably improved by targeted instruction based on research and the explanation of error categories as isolated in this thesis. It is not possible to apportion the improvement to the individual thrusts of gist extraction, vocabulary instruction, individual interaction with text and discussion of error source but in

combination they appear from this small follow-up study to have a favourable effect at least with poor comprehenders.

It is proposed to use the same methods with a group of more average comprehenders where the gap between chronological age and reading age, is not so great, to better gauge its usefulness as an instructional programme. The new element in such a programme is the category system of recurring errors made by children, and discussion of possible error sources. Extraction of main ideas and vocabulary development are usual ongoing class language activities. The possible effect of extra attention given to a highlighted group must also be remembered

7.6 THE CATEGORY SYSTEM AS A TEACHING METHOD

One of the problems of teaching comprehension skills is that they are not specific teachable units which can be accumulated. Comprehension is more an intermesh of many skills and if it is separated too much into individual components it may be so fragmented as to be detached from the process. Many language exercises undertaken in the classroom are similarly separated from the normal practice of comprehension. In concentrating on the individual parts, the essentially global nature of comprehension as a tool which pupils can use to aid their learning is masked.

If the category system is of teaching value its strength lies in its general nature. It can be applied to any text in the classroom and its validation by teachers shows

that it can be understood and applied with the minimum of prior instruction. Explanation as to possible type and source of error can be given as part of the feedback to pupils that is good teaching practice and no separate time-consuming exercises have to be done. Scrutiny of the individual categories of error suggests points which can be incorporated into general classroom teaching and contribute to the overall development of comprehension skill.

7.6.1 *EXTRANEOUS ITEMS*

The Scottish Education Department's Report Assessment of Achievement in English Language (1988) found that poor readers at all ages made many responses unrelated to the theme of the text while Brown & Smiley (1978) recorded that many young children find it more difficult to ignore irrelevant material. The ability to extract the gist of a text is necessary for comprehension and Loman & Mayer (1983) suggested that signalling was effective in promoting better processing of text. Signals were signs such as introductory sentences, underlined headings and connecting phrases which could be used to direct attention to the main facts and argument so that the need to bring in additional material to embellish the responses would be lessened, and learning improved.

7.6.2 *PREDOMINANCE OF STEREOTYPES*

A 'script' as defined by Schank & Abelson (1977) is a stereotypical knowledge structure describing a common routine e.g. going to a restaurant, and is an

elaborated version of the 'frame' introduced by Minsky (1975). A script is built up from general knowledge and is a type of fixed idea about how things are or should be done. Children appear to bring stereotyped ideas based on experience to bear on the comprehension process, reaching conclusions from the verbal input combined with their established scripts. Activities which broaden experience and general knowledge are likely to lessen dependence on fixed scripts by showing alternative possible explanations of textual content.

7.6.3 *INFLUENCE OF PREVIOUS KNOWLEDGE*

Children expect text to make sense and expectation has a part to play in this category of error so prediction exercises during reading in the classroom could be helpful in decreasing errors of this type. If text does not appear to make sense there is an effort made to make it meaningful (Bartlett, 1932). Zabrucky & Moore (1989) think that the integration of prior knowledge with textual information develops early and requires only basic reading skills whereas integration of information across sentences develops later. When confronted with text children may not have the appropriate schemas into which they can assimilate the incoming information or they may comprehend in a sentence at a time fashion, without making inter-sentence connections. Holzman *et al.* (1981-82) suggest that the use of advance organisers might help children who have less background information on which to anchor facts. 'Organisers' - instructions and information which arouse expectations and give help with the conceptual framework - work by providing a base for the assimilation of new material but they must be linked to the child's

existing knowledge base. This can be done by the addition of appropriate introductory paragraphs setting the 'scene' of a text.

7.6.4 *CONFUSION OF WORD MEANING*

Observation of children reading aloud in school demonstrates quite clearly that many, when confronted with a difficult word to decode fail to read on to get the meaning from the remainder of the sentence. This may be what happens when they attach the wrong meaning to words encountered in comprehension tasks. Davis (1972) found a strong correlation between vocabulary knowledge and general comprehension; vocabulary instruction might therefore improve reading comprehension. Research has been done to ascertain the best way of improving vocabulary knowledge as an aid to comprehension. Both Wixson (1986) and Beck *et al.* (1982) emphasise that comprehension improvement results from vocabulary instruction if connections among the concepts in the reader's semantic memory are made. Their findings favour the practice of web learning as opposed to linear learning. Vocabulary development work which may merely be responses to words is insufficient. McDaniel *et al.* (1989) found that the use of mnemonics by which the sound of a keyword was related to a verbal image was a superior method of vocabulary learning to deduction of meaning from context, even for college students. The keyword method could be implemented with little training and practice and its superiority in McDaniel's research has implications for discovery learning methods which are expected to give better understanding than direct instruction.

7.6.5 *DISCRIMINATION ERRORS*

This category of errors is also affected by pupil expectations so again, advance organisers could be helpful. It may also be affected by the manner of presentation of the text, e.g. size, density and colour of type, spacing of lines and layout of worksheet pages. Material given to pupils for comprehension purposes should be easily legible and methodically set out so that discrimination errors are not increased by the actual layout of the printed text.

7.6.6 *DISREGARD OF STATED FACTS*

7.6.6.1 Supplementary Investigation

From examination of material collected in pilot studies and the main study, the most interesting feature was the lack of evidence that subjects paid to the information explicitly stated in the texts. In an attempt to discover whether subjects were aware of these facts and had discarded them, or whether they had failed to notice them, a set of questions about the dragon text was give to a Primary V, rural class, not previously involved in the study (Appendix 1, No. 34). The exercise was handled by the teacher and treated as a normal class lesson. Copies of the text were not withdrawn, either while the questions were being answered, or subsequently while drawings of the scene as described in the text were being produced.

In spite of having answered correctly the question, "what colour was the dragon?", seven pupils out of 24 drew it as green. Although 21 pupils had answered correctly, that the dragon was sleeping, 11 of those drawn were definitely not in the sleeping position. Moreover, 15 dragon tails were outstretched instead of coiled, and 11 dragons had outstretched wings in direct contradiction of the stated fact that they were folded. Only two children in the class were poor readers, but the class had been involved with a computer program "Dragon World", and there were collage pictures of green dragons on the classroom walls.

The experiment was repeated with 15 apparently competent readers in primary VII to see if the disregard for stated facts extended to another age group not working with the computer program.

On this occasion two readers wrote that the dragon was red and questioning revealed that they had transposed the word from elsewhere in the passage. A third wrote that it was golden but like the other, drew it red. They were not sitting in the same group. Seven dragon tails were definitely not coiled and three dragons had outstretched wings.

It appeared therefore, that even pupils about to leave primary school tended to disregard the information in the text when drawing a representation of it. Possible reasons are that they do not see the writing and drawing tasks as related, or that they use skimming and scanning strategies to pinpoint required answers without properly absorbing the message in the print.

Zabrucky & Ratner (1985) noted that in evaluation tasks, third grade pupils did not look back as often as sixth grade but in this present research, few pupils in any age group appeared to do much re-checking of the text after the initial reading. Reference to the text to check if facts used in answer are actually stated, could be encouraged. The same researchers noted the importance in evaluation tasks of reading for the required purpose. If pupils are to assess the importance of information in the text and extract the gist without wandering off into avenues of personal interest which have no connection with the material in hand, they must have clear objectives. Clear explanation of task requirements should help cut down the errors in this category.

7.6.7 *LITERAL INFORMATION*

Because much of what pupils learn in school must be extracted from text it is of premier importance that they learn to extract the salient facts or intended message. Errors in the category of 'Literal information' are largely due to surface reading – taking the words at their face value without processing the deeper meaning of the text. Rinehart *et al.* (1980) advocate summarisation training as a tool for improving reading. Producing a summary of a text implies the ability to extract the main facts, and Doctorow *et al.* (1978) suggest that having to produce a summary, results in deeper processing of text. Rinehart advocates direct instruction in identifying main ideas while Brown & Smiley (1978) point out the benefit of note-taking and underlining important facts during reading. This latter practice would not be practical with books but could prove very useful when

worksheets are being used. All these practices could be implemented by teachers during ongoing class work in comprehension and should direct the pupils away from the surface meaning to the deeper message of the connected prose.

7.6.8 *REPRODUCTION*

'Reproduction' errors were found when pupils copied, verbatim, extracts from the text and betrayed through lack of cohesion, their miscomprehension. Effective comprehension implies an ability to express the material in one's own words which still carry the meaning. The message is retained rather than the actual words, as the text has been assimilated and re-expressed in summary form. This can be aided by attention to the structure of the text, noting features such as paragraphs, key sentences and cohesive ties. These can form a framework for organisation of the textual message in memory and so increase comprehension, and on to this, interrelated concepts and details can be mapped. Meyer *et al.* (1980) found a strong relationship between comprehension skills and the top-level structure of a text. It is important, also, that pupils express answers in their own words, as efficient reproduction can mask many comprehension problems.

7.6.9 *JUSTIFICATION*

Most justification errors arose from wrong inferences made by readers and their subsequent effort to explain them as part of the text. Chou *et al.* (1989) found wrong inferences to be both text-based and reader-based. There were more of the

latter, and they were made by college students as well as in fourth and sixth grades. These wrong inferences arose because of unfamiliarity of textual material or because of over-familiarity so that unrelated information was introduced and built on. Text structure seemed less influential in producing wrong inferences, but recent teaching did have an effect. Reader variables such as interests, prior knowledge and attitudes had important effects as they caused the readers to have expectations upon which wrong inferences were based. Prediction work involves the drawing of inference, but may be limited by capacity of working memory. A combination of checking of text for stated facts and prediction should decrease errors in this category. Teachers, knowing the background and interests of the members of their classes are in a position to judge the source of many wrong inferences and to explain those to the pupils. Errors of justification tend to be personal to each child and can best be handled by discussion with the teacher.

7.6.10 *TRANSPOSITION*

This is possibly the easiest category of error to correct as it is text based and requires from the pupil careful reading with fluency so that phrases and clauses are absorbed as clusters and not as isolated words. Clusters can be attached to the framework of the mental representation whereas single words tend to become transposed in memory. Careful reference to the text can show the source of each error and quick surface reading which is suitable for skimming and scanning may

contribute to their creation. Encouragement of multiple passes and reading for gist should decrease them.

7.7 STRENGTH OF CATEGORY SYSTEM

The teaching suggestions offered to remedy high error scores over the ten categories are not new and individually they are used on occasion in classroom lessons. As noted they are all based on research findings, in the field of reading development. On its own the knowledge that a pupil lacks comprehension skill is rather like the knowledge that a child has a low reading age. As a measure for comparison it is useful but in the wide field of reading and comprehension, it gives the teacher no guidance about where to start with remedial action. The teaching approaches discussed in this chapter are targeted towards decreasing errors in individual categories, and hence improving overall comprehension.

The strength of the category system as a teaching tool is that is allows comprehension errors to be classified so that the categories of recorded errors can be used as targets at which specific teaching may be aimed for either groups or individuals. Using categories as starting points does not involve additional exercises, as teaching is applied to the texts the children use as part of the class curriculum, and the method can be used with any textual material regardless of type e.g. narrative, informative etc. Teaching using the category system involves for the pupils, constructive feedback which is also part of good practice and they can see that discussion applies directly to errors which they have made, and is not

an unrelated exercise, which can take up much of a language lesson in the hope that a skill may be transferred. Reducing the frequency of occurrence of any type of error should increase the very global skill of comprehension of text which is an important skill in adult life.

7.8 THE CURRENT SITUATION

A recent development in Scottish Education is the introduction of the Scottish Education Department *Policy for the 90s* (SED, 1989) which applies to curriculum and assessment of pupils aged from 5–14 years. There is no strand in the English Language 5–14 Guidelines (SED, 1990) actually designated 'comprehension' but it forms a major aspect of the four main features of talking, listening, reading and writing. This holistic view of language understanding is described in Working Paper No. 2, p. 19 "whereas once it was thought desirable to start with the smaller units of language (the word and sentence), it is now recognised that pupils' ability to understand and use language depends more on their ability to see how larger units are manipulated". The document suggests that specific aspects of comprehension such as punctuation, grammar and vocabulary development may be promoted within this context.

The main problem for teachers faced with pupils who are poor comprehenders is knowing where to start. Suggested pupil outcomes in the 5–14 guidelines, indicate the emphasis to be put on production of complete pieces of work presented in oral, written, pictorial or other format rather than on answers to questions involving

specific sub-skills. The all-round ability to handle incoming and outgoing information in a reasonably competent manner is the skill, towards which pupils are aspiring.

In *"Curriculum and Assessment in Scotland - A Policy for the 90s"* (Scottish Education Department, 1989) the proportion of time to be allocated directly to language is 15% i.e. approximately 40 minutes per day. That is to cover reading, writing, listening and speaking. Durkin (1979) found that less than 1% of instructional time was spent on formal comprehension instruction. With the demands on time of all the subjects in today's broad curriculum, it is important that comprehension development is not neglected or confused with comprehension assessment.

Success in comprehension depends on competence in reading. Pupils with comprehension problems may be competent decoders and even read with fluency and expression through knowledge of punctuation, although they struggle with the extraction of the meaning and organisation of it in memory. Combined constraints of shortage of teacher time and apparent competence in oral reading of some pupils in the early primary classes may contribute to the comprehension difficulty of these readers in later classes. The child who has 'cracked the code' may, through a combination of peer and parental competition and curriculum pressures on the teacher, be allowed to progress so quickly through the reading programme that the material which can be successfully decoded is in structure, concept and vocabulary inappropriate for the developmental level of the reader. The pressure on the busy

teacher to hear young children read individually may detract from the discussion time which is so necessary to promote comprehension. As the pupils move through the upper primary, and more class time is given to silent reading these readers may not betray their miscomprehensions in group discussion and develop strategies for 'getting by' in written work.

When the feasibility studies for this thesis were carried out, reading in the selected schools was taught by means of "look and say" structured reading schemes with a built-in or teacher supplied phonic back-up. There was therefore little difference in the early reading instruction methods experienced by subjects although they had different teachers. There is now a slight move away from structured schemes towards a greater variety of reading books. It will be interesting to see if the change improves or detracts from comprehension ability of older primary pupils over the next few years.

7.9 QUESTIONS FOR FUTURE RESEARCH

Whether the findings of this thesis about pupil ability indicates a change over time or whether average ability readers ever achieved higher order skills to any great degree, is not known. There has certainly been tremendous change in the classroom environment over the past three decades with discovery learning and the advent of technology. More material for teaching and learning is available than ever before but is it too mechanical and visual or is that a necessary adaptation to the demands of modern society?

In a classroom of computer screens, television and video recordings, is sufficient time being given to text processing or is that less necessary than in years gone by? Undoubtedly technology has much to offer pupil and teacher but ready made images presented on screen may be detracting from the ability to form images from print, and application of imagery has been found to be a facilitator of comprehension of text (Steingart & Glock, 1979). Salomon (1984) suggests that if pupils perceive television as 'easy' they will invest little mental effort in processing, acquiring only a little impressionistic information, which presumably would not be properly assimilated into the conceptual network.

Although it is necessary to hear children read aloud to check on decoding skill, fluency and pronunciation, has perhaps too much weight been given to it as a means of pacing children's progress through the reading programme especially in the lower primary classes? The greater emphasis being given to talking in the English Language 5–14 Guidelines (SED, 1990) may lead to more discussion with pupils about what they have absorbed from their 'reading books' and encourage them to reflect on it rather than merely reproduce it. Often a child in the early stages of oral decoding ability may be observed deriving much enjoyment from a book he or she has chosen to look at.

The problem of the good oral reader who is a poor comprehender is the one generally presented to me in learning support work but I have also encountered the reverse. A Primary VI pupil, arriving with a catalogue of reading failure and with experience of many 'remedial' reading books which he had been given because of

his 'low reading age', came third from the top of his class in a routine written comprehension screening test. Unfortunate early experiences with oral reading had made 'reading aloud' a tremendous ordeal, although his parents persisted that he liked books and spent a lot of time reading to himself. That he could do so, and comprehend at an above average level for his age group, soon became obvious in class work.

Whether this was a fairly isolated occurrence or merely one which is less easily uncovered, is an interesting avenue for further research. Investigation could well show that ability in reading aloud and reading for understanding are not so closely correlated as tends to be supposed by teachers of primary children. We have to take account of this when teachers complain that pupils do not always seem to understand even when they have no apparent difficulty in reading – the starting problem for this thesis. We need also to recognise the intricate nature of comprehension and the problems of recognising what is actually understood.

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APPENDIX 1

List of Test Materials and Results of Validation Trials

CLOZE TEXT FOR ALICE IN WONDERLAND

The White Rabbit took a watch out of its waistcoat pocket, looked at it, and hurried ***on***. Alice ran across the field after ***it*** and was just in ***time*** to see it pop down a large rabbit ***hole*** under the hedge. In another moment ***Alice*** went down after it, never once considering ***how*** in the world she was to ***get*** out again. After going straight ***along*** the tunnel for some way, Alice ***found*** herself falling down what ***seemed*** to be a deep well. She noticed that the ***sides*** of the well were filled ***with*** cupboards and book-shelves. Here and ***there*** maps and pictures hung upon pegs. She ***took*** a jar labelled 'Orange Marmalade' ***from*** a shelf, but it was empty.

The words in italics are those omitted in the cloze text.

From *'Alice in Wonderland'*, Lewis Carroll, 1865

Victor Gollancz, 1984 Edition

CLOZE TEXT FOR WIND IN THE WILLOWS

The Badger, who wore a long dressing-gown, carried a candlestick in his paw and had probably been on his way to ***bed*** when their summons sounded. He shuffled ***on*** in front of them, carrying the light, ***and*** the little animals followed him down ***a*** long gloomy passage into a central ***hall***. There were stout oaken doors in ***the*** hall. One of these was flung ***open*** and they found themselves in the ***warmth*** of a fire-lit kitchen. The ***floor*** was worn red brick, and in the ***middle*** of the room stood a long ***table*** of plain boards placed on trestles. ***At*** one end were spread the remains ***of*** Badger's supper, and hams and ***baskets*** of eggs hung from the ***ceiling***.

The words in italics are those omitted in the cloze text.

From *'The Wind in the Willows'*, Kenneth Graham, 1908

Methuen Children's Books, 1980 Edition

TEXT OF LOST CITY

The Indian City was almost a heap of ruins, but it seemed very wonderful and splendid. Some king had built it long ago on a little hill. You could still trace the stone causeways that led up to the gates. Creepers had grown into and out of the walls and the ancient battlements were tumbled down and decayed. A great roofless palace, crowned the hill, and the cobblestones in the courtyard where the king's elephants used to live, had been thrust up and apart by grasses and young trees. From the deserted palace, you could see rows of roofless houses, looking like empty black honeycombs, and the shattered domes of temples with wild figs sprouting on their sides.

Source:	*'The Jungle Book'* by Rudyard Kipling, 1894 - 1983 Edition - Book Club Associates in Association with MacMillan Children's Books.
Material:	Imaginative
Style:	Factual
Fog Reading Age:	12.5 y
Fry Grade:	7
Analysis:	2 levels 15 propositions 84 triples 119 words

TEXT OF GOLDEN DRAGON

There he lay, a vast golden dragon, fast asleep. A thrumming came from his jaws and nostrils, and wisps of smoke, but his fires were low in slumber. Beneath him, under all his limbs and his huge coiled tail, and about him on all sides, lay countless piles of precious things, gold, gems and silver, red-stained in the light. Smaug lay, with wings folded like an immeasurable bat, turned partly on one side, so that Bilbo could see his underparts, crusted with jewels and fragments of gold from his long lying in his costly bed. He had heard tell of dragon-hoards before, but the splendour and glory of such treasure had never yet come home to him.

Source:	*'The Hobbit'* by J.R.R. Tolkien, 1937 - Unwin Books 1966
Material:	Imaginative
Style:	Factual
Fog Reading Age:	13.1 y
Fry Grade:	8
Analysis:	4 levels 19 propositions 91 triples 119 words

TEXT OF JUNGLE TRAIN

I once travelled on a train which ran through the jungle. The carriage was like a cage with a seat in it. It protected visitors from wild animals. The train stopped at a spot where there were hundreds of monkeys. At once they came up to look at me. They pointed their fingers at my face and my boots. The mothers lifted their children up so that they could have a better view. They all found me very interesting and several of them seemed to be laughing at me. One old monkey handed me a banana through the bars. I was upset by being stared at but the animals seemed to get a lot of fun out of it.

Source:	*'Grandmother Oma'* by Ilse Kleberger – 1964 Scholastic, 1966 Edition
Material:	Narrative
Style:	Imaginative
Fog Reading Age:	7.61 y
Fry Grade:	4
Analysis:	2 levels 20 propositions 88 triples 119 words

TEXT OF VIKING FEAST

At the end of the summer Knut and his warriors sailed back to Norway. Their ship was loaded with goods and prisoners from many successful raids. Astrid prepared a huge feast to celebrate the raiders' victories. She and the women worked hard cooking a splendid meal. For such a special occasion, cows and sheep from the farm, and deer and wild boars from the forest, were roasted on spits. Knut invited other chieftains to the feast, and the longhouse rang with their laughter and songs. Each raider bragged of his bravery and cunning against the enemy. Long into the night, they drank and talked, telling stories of storms at sea, and the strange lands and people they had seen.

Source:	*'The Time Traveller Book of Viking Raiders'* by A. Civardo and J.G. Campbell, 1977 Usbourne Publishing
Material:	Factual
Style:	Narrative
Fog Reading Age:	8.13 y
Fry Grade:	6
Analysis:	3 levels 20 propositions 95 triples 119 words

TEXT OF FEEDING THE WORLD

For thousands of years, Man has been cultivating the earth for food. This has become more difficult as the number of people in the world has increased. Three babies are born somewhere in the world, every second. There are as many as 50 million new mouths to feed every year. If everyone is to have enough to eat, science must increase the food-growing areas of the world and improve the food yield of the earth itself. In Israel work has already begun on turning the sands into soil. Dams have been provided to improve irrigation. Chemicals help to make the soil more fertile and allow more food to be grown. Scientists are even making tasty artificial meat from beans.

Adapted from *'Feeding the World'*, The Story of Science, Book 2

Edmund Hunter, Ladybird Books Ltd, 1973

TEXT OF THE POLICEMAN

We can tell a policeman by his dark uniform and helmet. A police constable's main job is to keep law and order and to protect us. He also helps to control traffic and to see people safely across the road. When a policeman is on point duty he wears white armlets.

Policemen have many kinds of duty. Some patrol the streets and some policemen direct the busy traffic. Others drive police cars or ride motor cycles. They keep in touch with the police station by radio.

There are many other members of the police force, some of whom do special work and are called detectives. Detectives carry out their duties in ordinary clothes so that they are not recognised.

From *'The Policeman'* – People Who Work For Us

Philograph, 1967

TEXT OF HIGH SPEED TRAINS

The fastest trains in general service run in France and Japan. Perhaps the most famous is the Tokaido Express, which, until recently, was the world's fastest regular passenger service, between Okayama and Osaka in Japan. This bullet-like train travels at 250 kilometres per hour in complete safety, under the guidance of automatic controls. The Tokaido still makes its regular super-fast journey, but it is no longer the only train to do so. Now France has an equally fast train service between the cities of Paris and Lyons. Both Japanese and French superfast express trains use electric locomotives with overhead wires. Faster trains have been made to run on rails, but they are not in regular service.

From *'Fifty Facts About Speed and Power'* by Ron Taylor

Published by Franklin Watts, 1982

TEXT OF FOSSIL FUELS

Early people had to rely on their muscles, fuelled by the food they ate, to provide energy for shifting loads. We have machines and engines far more powerful than any human body. Such inventions can shift huge loads. Others can light and heat whole cities. Many engines get their energy from fossil fuels. These are fuels formed many millions of years ago, when the remains of certain living things were trapped beneath the ground. Coal is the remains of pre-historic trees that grew in swamps about 300 millions years ago. Oil and natural gas are the remains of tiny animals and plants that lived in ancient shallow seas. They were trapped underground by movements of the Earth's crust.

From *'Planet Earth'* by David Lambert, 1982

(Picolo Fact Book) Pan Books

QUESTIONS USED FOR TEST OF LOST CITY TEXT FOR PASSAGE DEPENDENCY

1. What could have happened to the city?
2. What are 'causeways'?
3. What are 'creepers'?
4. Who would build the city?
5. What building might be on top of the hill?
6. What do you mean by a 'deserted building'?
7. Which animals might have been kept in the courtyard?
8. What had happened to the cobblestones?
9. What would you see from the hill?
10. Which buildings would have domes?

QUESTIONS USED FOR TEST OF GOLDEN DRAGON TEXT FOR PASSAGE DEPENDENCY

1. What colour do you think the dragon would be?
2. Where would he have his lair?
3. Name a creature that the dragon might look like?
4. What does 'immeasurable' mean?
5. Name two types of jewel.
6. Name two precious metals.
7. What sounds would the dragon be making?
8. Where would the fire be?
9. What is a 'dragon–hoard'?
10. What does 'slumber' mean?

QUESTIONS USED FOR TEST OF JUNGLE TRAIN TEXT FOR PASSAGE DEPENDENCY

1. Describe the 'observation' carriage.
2. Which animals would you see from the train?
3. Which plants might you see from the train?
4. What would the visitors do when the train stopped?
5. How would the animals feel about the people?
6. how would the people feel about the animals?
7. Do you think the passengers enjoyed the trip?
8. Where would the train stop?
9. How would the passengers be protected from the wild animals?
10. In which country might this story have taken place?

QUESTIONS USED FOR TEST OF VIKING FEAST TEXT FOR PASSAGE DEPENDENCY

1. What name would you give to the Norwegian raiders?
2. What would they have on their ship?
3. What would the raiders eat at their celebration feast?
4. How would the food be cooked?
5. How would the raiders entertain each other after the meal?
6. In what type of building would the meal be held?
7. What would the raiders' ship look like?
8. Name two wild animals from the Norwegian forest?
9. Who would be invited to the feast?
10. What would they talk about?

LOST CITY TEXT - ERROR LIST FOR FIRST VALIDATION TRIAL

Please enter the code letter and number which you consider to be appropriate, opposite each error, with reference to the definitions and text.

e.g. (a) Wigwams in the Indian City arising from reader's concept of 'Indian'.

(b) "Battlement is people fighting arising from confusion with 'battle'.

1. 'Creepers' drawn as insects.
2. The houses were sticky.
3. The elephants were black.
4. The temple roofs were golden.
5. Traditional drawing of a house (two up/two down).
6. The temple roofs were shaking.
7. "and young trees and grasses and empty black honeycombs".
8. A portcullis on the castle gate.
9. "The hill was stone".
10. 'The courtyard had been thrust up by honeycombs'.
11. Drawings of temples without domes.
12. Walls marked in hexagonal patterns.
13. Swings and roundabouts in city park.
14. Bombers destroying the city.
15. The elephants were thirsty.

GOLDEN DRAGON TEST - ERROR LIST FOR FIRST VALIDATION TRIAL

Please enter the code letter and number which you consider to be appropriate, opposite each error, with reference to the definitions and text.

e.g. (a) A walking dragon when it was described as 'Fast asleep'.

(b) Dragon drawn laying an egg derived from 'There he lay'.

1. Dragon picture minus jewels.
2. 'a fierce dragon'.
3. 'its coilless tail'.
4. 'The jewels were crushed'.
5. But the treasure never came home to him.
6. There was fire beneath him (the dragon).
7. The dragon's wings were red.
8. His bed was cosy.
9. Bilbo lay in bed.
10. Dragon with outspread wings.
11. The dragon had heard of hoards.
12. Dragon lying on a bed.
13. The jewels glint in the sun.
14. A treasure chest.
15. 'He never has as much glory as other dragons'.

JUNGLE TRAIN TEXT - ERROR LIST FOR FIRST VALIDATION TRIAL

Please enter the code letter and number which you consider to be appropriate, opposite each error, with reference to the definitions and text.

e.g. (a) Tunnel for jungle train when no train is mentioned.

(b) Passenger giving banana to monkey rather than vice-versa as stated.

1. The children were passengers.
2. The animals were passengers.
3. The children were babies.
4. The monkeys laughed because they did not look like this.
5. The carriage was like a cell.
6. The driver was hot so he opened the sun roof.
7. Writing e.g. "Jungle ..." on train.
8. Drawing of train without cage.
9. "Ha-ha" sounds beside animal drawings.
10. Wash-basin in railway carriage.
11. The man gave the monkey a banana.
12. The monkeys threw bananas at the train.
13. A monkey went over the track and the train stopped.
14. I was upset until a monkey handed me a banana.
15. If carriage a cage with a seat in it visitors wild animals.

VIKING FEAST TEXT - ERROR LIST FOR FIRST VALIDATION TRIAL

Please enter the code letter and number which you consider to be appropriate, opposite each error, with reference to the definitions and text.

e.g. (a) The inclusion of the sun in the illustration.

(b) Sailor with telescope in crow's nest of viking boat.

1. Prisoners tied to stakes during feast.
2. Man fishing from the boat.
3. Drawing Knut minus warriors.
4. Bell on top of longhouse.
5. Reference to Knut as 'she'.
6. Knut sailed back from Norway.
7. Feast with modern food, dress and equipment.
8. Guests arriving with flowers.
9. Chickens roasting on spits.
10. Astrid went shopping for food.
11. Knut was a soldier.
12. People in the longhouse played records.
13. People in the longhouse rang bells.
14. Astrid was hunting.
15. Cows were milked.

TEACHER RATING OF LOST CITY TEXT - FIRST VALIDATION TRIAL

Example	Rater Number 1	2	3	4	5	6	7	8	9	10
1	B1	B1	C1	B1	B1	A3	A3	B1	A3	A3
2	C1	C1	A2	C1	C1	C1	C1	E	C1	E
3	E	E	E	A1	A1	E	E	A2	A3	E
4	A3	A2	A1	A2	A1	B1	B1	A2	A2	A3
5	A2	A2	A2	A3	A3	A2	A2	A3	A2	A3
6	B1	B1	B1	D	B1	B1	B1	B2	A1	B1
7	C2	C2	C2	E	C1	C2	C2	C2	C2	C2
8	A1	A2	A3	A2	A3	A3	A3	A3	A1	A3
9	E	C2	E	A1	C2	C2	C2	E	A2	E
10	D	E	B3	E	B3	C2	C2	C2	B3	C2
11	D	B3	B3	C1	B1	B3	B3	B3	B3	B3
12	B1	A3	B1	B3	A1	A3	A3	C1	A1	E
13	A3	A1	A1	A3	A1	A1	A1	A1	A1	C2
14	A3	D	A3	D	A1	D	D	A3	A3	D
15	B2	B2	A1	A2	A1	B2	B2	B2	B2	A1
Rater	1	2	3	4	5	6	7	8	9	10

Example	Number of Agreements in Category A1	A2	A3	B1	B2	B3	C1	C2	D	E	Omission	% Inter Teacher Agreement	Researcher Rating
1			4	5			1					50%	B1
2		1					7			2		70%	C1
3	2	1	1							6		60%	E
4	2	4	2	2								40%	A3
5		6	4									60%	A2
6	1			7	1				1			70%	B1
7							1	8		1		80%	C2
8	2	2	6									60%	A3
9	1	1						4		4		40%	E
10						3		4	1	2		40%	E
11				1		7	1		1			70%	B3
12	2		3	2		1	1			1		30%	A3
13	7		2					1				70%	A1
14	1		4						5			50%	D
15	3	1			6							60%	B2
Total	21	16	26	17	7	11	11	17	8	16	0		

Grand Total 150

TEACHER RATING OF GOLDEN DRAGON TEXT - FIRST VALIDATION TRIAL

Example	Rater Number 1	2	3	4	5	6	7	8	9	10	Number of Agreements in Category A1	A2	A3	B1	B2	B3	C1	C2	D	E	Omission	% Inter Teacher Agreement	Researcher Rating
1	B3	B3	B3	B3	C1	B3	B3	B3	B3	B3						9						90%	B3
2	A2	A2	A3	A3	A2	A2	A2	A2	A2	A3		7	3									70%	A2
3	B2	B1	B2	B2	B3	B2	B2	B1	B2	B3				2	6	2						60%	B2
4	B2	B2	B2	B2	B2	B2	B2	A3	B2	B2			1		9							90%	B2
5	E	C1	B3	E	C1	C1	C1	C2	C2	B1				1		1	4	2		2		40%	C2
6	C1	C1	B1	D	C2	B1	B1	E	C1	C1				3			4	1	1	1		40%	B1
7	E	A1	C1	A2	A2	A3	A3	A1	A1	E	3	2	2				1			2		30%	E
8	A1	B2	B2	B2	B2	B2	A1	B2	B2	B2	2				8							80%	B2
9	B3	E	E	B1	C2	D	B2	E	B3	E				1	1	2		1	1	4		40%	E
10	B3	B3	B3	A2	B3	B3	B3	B3	B3	B3		1				9						90%	B3
11	C2	E	E	D	C2	B1	B1	C2	B3	E				2		1		3	1	3		30%	C2
12	A2	A2	A1	A1	C1	B1	D	B1	C1	A3	2	2	1	2			2		1			20%	C1
13	A2	A1	A2	A3	A3	A1	B1	A1	A2	A3	3	3	3	1								30%	A3
14	A2	A3	A1	A1	C1	D	D	A2	A1	A1	4	2	1				1		2			40%	A1
15	C2	C2	B1	E	C2	B3	B3	C1	C2	C2				1		2	1	5		1		50%	D
Rater	1	2	3	4	5	6	7	8	9	10 Total	14	17	11	13	24	16	14	12	6	13	0		

Grand Total 150

TEACHER RATING OF JUNGLE TRAIN TEXT – FIRST VALIDATION TRIAL

Example	Rater Number 1	2	3	4	5	6	7	8	9	10	Number of Agreements in Category A1	A2	A3	B1	B2	B3	C1	C2	D	E	Omission	% Inter Teacher Agreement	Researcher Rating
1	D	A2	A3	A2	A2	A2	C1	B3	A1	A3	1	4	2			1	1		1			40%	A2
2	E	E	E	B3	B3	E	E	E	A3	E			1			2				7		70%	E
3	A1	A2	B1	A2	A2	D	C1	B3	A3	A3	1	3	2	1		1	1		1			30%	A2
4	D	D	D	D	B3	D	C2	D	B1	D				1		1		1	7			70%	D
5	B1	B3	-	A3	A3	B3	B1	B1	B1	A3			3	4		2					1	40%	A3
6	A1	A1	A1	A1	A1	A1	A3	A3	A2	A1	7	1	2									70%	A1
7	A1	A1	A1	A3	A2	C1	C1	A3	-	A3	3	1	3				2				1	30%	A1
8	A2	B3	B3	B3	B3	B3	B3	B3	C1	B3		1				8	1					80%	B3
9	A3	A1	C1	C1	B1	C1	C1	C1	-	C1	1		1	1			6				1	60%	C1
10	A1	A1	A1	A3	A1	A3	A3	A3	A2	A3	4	1	5									50%	A1
11	B3	B3	B3	A2	B3	B3	B3	B3	A3	B3		1	1			8						80%	B3
12	B1	A1	A3	E	C2	E	D	B3	A1	A3	2		2	1		1		1	1	2		20%	E
13	D	D	B3	D	A1	A1	A1	B3	A3	A1	4		1			2			3			40%	D
14	E	B3	D	E	C2	C2	C2	C2	A1	A3	1		1			1		4	1	2		40%	D
15	C2	C2	-	C2	C1	C1	C2	D	C2	E							2	5	1	1	1	50%	C2
Rater	1	2	3	4	5	6	7	8	9	10 Total	24	12	24	8	0	27	13	11	15	12	4		
											Grand Total								150				

TEACHER RATING OF VIKING FEAST TEXT - FIRST VALIDATION TRIAL

Example	Rater Number 1	2	3	4	5	6	7	8	9	10
1	A3	A3	A1	A1	A3	B1	B1	A1	A1	A1
2	A2	A1	A1	A3	A1	A2	A2	A3	A2	A3
3	B3	B3	-	A3	C2	B3	B3	B3	B3	B3
4	C1	C1	C1	C1	B1	C1	C1	C1	B2	C1
5	E	B3	-	B1	C2	C2	C2	B3	B3	B3
6	B2	B3	B3	B3	B3	B2	B2	-	B3	B3
7	A1	C1	A3	A2	C2	A3	A3	A2	A2	A2
8	A1	A1	A1	A1	A1	A1	B1	A2	A2	A3
9	A3	3	A3	A3	A1	A3	A3	A3	B3	A3
10	A1	A1	A2	A1	A1	D	A1	A1	B3	A3
11	D	B3	A3	C1	B3	E	E	A3	B1	A2
12	A3	A2	A2	A2	C1	A1	A1	B1	A3	A3
13	C1	C1	C1	C1	C1	C1	C1	C1	B1	C1
14	E	A1	B3	A1	A1	B3	B3	A1	A1	A1
15	A2	A1	A3	A1	A1	B3	B3	B3	A1	A3
Rater	1	2	3	4	5	6	7	8	9	10

Example	Number of Agreements in Category A1	A2	A3	B1	B2	B3	C1	C2	D	E	Omission	% Inter Teacher Agreement	Researcher Rating
1	5		3	2								50%	A3
2	3	4	3									40%	A3
3			1			7		1			1	70%	B3
4				1	1		8					80%	B1
5				1		4		3		1	1	40%	E
6					3	6					1	60%	B3
7	1	4	3				1	1				40%	A2
8	6	2	1	1								60%	A1
9	1		8			1						80%	A2
10	6	1	1			1			1			60%	A2
11		1	2	1		2	1		1	2		20%	B1
12	2	3	3	1			1					30%	A2
13				1			9					90%	C1
14	6					3				1		60%	B3
15	4	1	2			3						40%	A3
Total	34	16	27	8	4	27	20	5	2	4	3		

Grand Total 150

DEFINITIONS FOR SECOND VALIDATION TRIAL

Child-centred Errors (CC)

Errors which arise because of factors brought to the text by the reader. These may be previous knowledge and experience, interests, beliefs or developmental level. They may fit in with the context or be entirely wrong but in line with reader's interpretation of text and visualisation of the scene. Information given in the text may be over-ruled by the child's fixed ideas that 'things are so'.

Text-centred Errors (TC)

Errors which arise from factors in the printed text and cover mis-reading, confusion over word-meanings and disregard of explicitly stated facts due to undue focus on isolated words and phrases and reader's assumptions. Pupils may select word-meanings which are wrong in the context or base answers on words which have been mis-read.

Errors Arising from Surface Reading (SR)

Errors which arise because reader treats text at face value and fails to get deeper meaning and metaphorical ideas. Tend to be masked by efficient reproduction of sections of the text for answers when it has not been properly absorbed and understood.

Errors Which Demonstrate 'Effort After Meaning' (EM)

Reconstruction of the text by the reader in an attempt to make sense of it. Results in wrong explanations in the attempt to reconcile apparently discrepant facts and transposition of words to other positions in the text. Reader tries to justify written responses.

SECOND VALIDATION TRIAL - ITEMS FOR CLASSIFICATION

Please classify these errors as child-centred (CC), text-centred (TC), errors arising from surface reading (SR) and errors demonstrating 'effort after meaning' (EM).

1. Drawing of Mary Queen of Scots' flight from Loch Leven Castle in helicopter emblazoned by a crown.

2. By how much it ... greater than? 'It must be an adding sum because greater means bigger, doesn't it?'

3. 'Clover' read as 'cloths'.

4. 'All insects can't be the same. You would call a bee a dragonfly if they were the same'.

5. 'The water vapour condenses'. Explanation - 'It gets smaller'. cf. soup or milk.

6. 'Windows all round it', in text; changed in summary to 'round windows'.

7. 'Why do people kill animals?' Answer - 'Because they are ill'.

8. 'Mungo Park was a recreation ground'. cf. McDiarmid Park in Perth.

9. 'Ting-a-ling' beside drawing of longhouse in response to description, 'The long-house rang'.

10. 'Why do six-year-olds lose their milk teeth? Because like foster mothers or temporary teachers they are only for a short time until stationary or correct ones come".

11. Red dragon drawn when text read, 'gold, gems, and silver, red-stained in the light'.

12. Asked to say whether a drawing of a cell was an animal or a plant. "I think it is a cell wall because there has got to be a cell wall to keep the plant in the pot".

13. Description in summary of text about Kipling's 'Lost Jungle City'. 'There must have been a battle because the city was ruined'.

14. Instruction, "Stop at station below", in a division lesson, resulting in subject going beyond target multiple because of vertical manner in which tables are conventionally written.

15. Flower-seller's basket drawn as decorated by 'flags' instead of irises described in the poem.

16. The instruction, "Draw a hamburger on a roll", resulted in a picture of a hammer on a roll.

17. People arriving for Viking Feast by car and bearing flowers.

18. 'Some king built the city', in text, resulting in picture of king brick-laying, complete with crown and robes.

19. Sailor with telescope in crow's nest on Viking longship drawing.

20. 'The king took his elephants and pulled the honeycomb to the temple', in summary when text read, 'the courtyard where the king's elephants used to live', and 'temples and houses like empty black honeycombs'.

RESULTS OF SECOND VALIDATION

TRIAL – INTER-TEACHER AGREEMENT

Researcher Classification		Teacher Classification										
1	CC	✓	✓	EM	✓	✓	✓	✓	✓	EM	✓	8
2	SR	✓	✓	CC	✓	✓	TC	EM	TC	TC	✓	5
3	TC	SR	SR	✓	SR	SR	✓	✓	✓	✓	✓	6
4	EM	✓	✓	CC	✓	CC	–	CC	CC	SR	CC	3
5	TC	✓	EM	EM	✓	✓	✓	EM	✓	CC	CC	5
6	TC	✓	✓	✓	SR	SR	EM	SR	SR	✓	✓	5
7	CC	✓	✓	TC	✓	✓	✓	✓	✓	✓	EM	8
8	CC	TC	✓	–	✓	✓	✓	✓	✓	SR	✓	7
9	SR	✓	TC	✓	TC	EM	CC	TC	TC	✓	CC	3
10	EM	✓	SR	✓	CC	CC	✓	✓	✓	✓	✓	7
11	SR	TC	✓	EM	✓	TC	✓	CC	TC	✓	✓	5
12	EM	✓	✓	CC	CC	SR	✓	✓	✓	✓	✓	7
13	EM	✓	✓	✓	✓	✓	CC	CC	CC	CC	TC	5
14	TC	✓	✓	CC	–	SR	✓	–	SR	CC	✓	4
15	SR	✓	✓	TC	EM	EM	CC	✓	✓	TC	TC	4
16	TC	✓	✓	✓	✓	CC	SR	✓	✓	CC	✓	6
17	CC	✓	✓	EM	✓	EM	✓	✓	✓	✓	✓	8
18	SR	✓	✓	EM	CC	✓	✓	✓	✓	EM	✓	7
19	CC	✓	EM	EM	✓	✓	✓	✓	✓	✓	✓	8
20	EM	✓	SR	TC	✓	✓	✓	SR	SR	SR	SR	4

CC = child–centred
TC = text–centred
SR = surface reading
EM = effort after meaning

INTER-TEACHER AGREEMENT - SECOND CLASSIFICATION IN MAJOR CATEGORIES

(Frequency of Occurrence Out of 10)

Item Number	Feast	Dragon	City	Train
1	8	9	5	7
2	10	10	7	7
3	7	10	6	6
4	2	9	8	7
5	5	6	10	6
6	9	5	8	10
7	8	7	9	7
8	9	8	10	8
9	9	5	4	6
10	8	9	4	10
11	3	4	8	8
12	8	5	5	4
13	9	9	9	5
14	6	7	5	4
15	7	6	6	7
Total	114	109	104	102
Average	7.65	7.27	6.93	6.80
Average %	76%	72%	69%	68%
Average percentage inter-teacher agreement			71.6%	

RESEARCHER-TEACHER AGREEMENT - SECOND CATEGORY IN MAJOR CATEGORIES

(Frequency of Occurrence Out of 10)

Item Number	Feast	Dragon	City	Train
1	8	9	5	7
2	10	10	7	7
3	7	10	6	6
4	8	9	8	7
5	1	6	10	3
6	9	3	8	10
7	8	2	9	7
8	9	8	10	8
9	9	5	4	6
10	8	9	3	10
11	3	3	8	8
12	8	2	5	3
13	9	9	9	3
14	3	7	5	3
15	7	1	6	7
Total	101	93	103	95
Average	6.73	6.20	6.87	6.33
Average %	67%	62%	69%	63%
Average author–teacher agreement in major categories			65.3%	

MATERIAL FOR DIRECTED WRITING - MAIN STUDY

LOST CITY

Underline the word which makes the sentence true for this passage.

a. The walls were covered with (insects, jewels, plants).

b. The elephants in the courtyard were (thirsty, black, dead).

c. The houses were (empty, sticky, hexagonal).

d. The temple roofs were (curved, golden, shaking).

JUNGLE TRAIN

Underline the word which makes the sentence true for this passage.

a. Beside the railway there were (visitors, houses, trees).

b. The carriage had (horses, bars, cages).

c. The children were (monkeys, passengers, babies).

d. The animals were (amused, frightened, upset).

VIKING FEAST

Underline the word which makes the sentence true for this passage.

a. Knut was a (policeman, raider, soldier).

b. Astrid was (shopping, hunting, cooking).

c. Cows were (cooked, milked, hunted).

d. People in the longhouse (rang bells, sang songs, played records).

GOLDEN DRAGON

Underline the words which make the sentence true for this passage.

a. The dragon was (laying eggs, sleeping soundly, talking noisily).

b. There was fire (beneath, within, about) him.

c. The dragon's wings were (red, coiled, huge).

4. His bed was (valuable, cosy, long).

TEXT FOR DIRECTED DRAWING

Make sketches to include these details as described in the passage.

LOST CITY

a. '... creepers had grown out of the walls'.

b. '... cobblestones in the courtyard had been thrust up'.

c. '... houses looking like empty black honeycombs'.

d. '... shattered domes of temples'.

JUNGLE TRAIN

a. 'A train ran through the jungle'.

b. 'The carriage was like a cage'.

c. 'The mothers lifted up their children'.

d. 'The animals seemed to get a lot of fun'.

VIKING FEAST

a. 'Knut and his warriors sailed back'.

b. 'Astrid prepared a huge feast'.

c. 'Cows were roasted on spits'.

d. 'The longhouse rang'.

DRAGON TEXT

a. '... he lay, a vast golden dragon, fast asleep'.

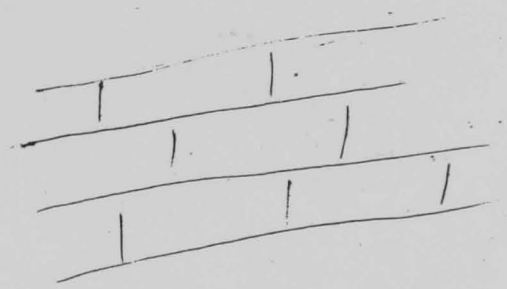
b. '... his fires were low in slumber'.

c. '... with wings folded like an immeasurable bat'.

d. '... his long lying on his costly bed'.

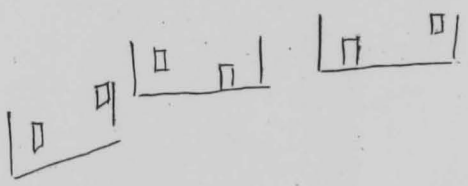
SKETCHES FOR DIRECTED DRAWING – LOST CITY TEXT

Make sketches to include these details as described in the passage

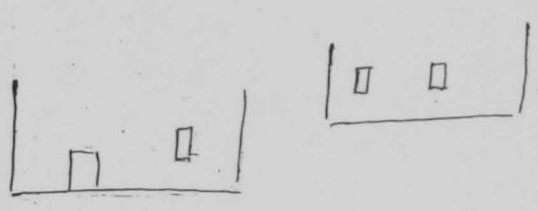


'creepers had grown out of the walls'

'cobblestones in the courtyard had been thrust up



houses looking like empty black honeycombs'



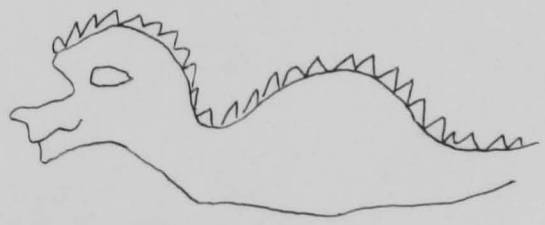
'shattered domes of temples'

SKETCHES FOR DIRECTED DRAWING – GOLDEN DRAGON TEXT

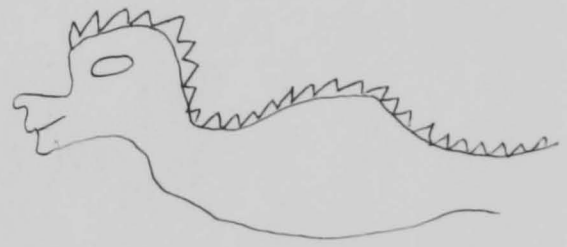
Make sketches to include these details as described in the passage

"he lay, a vast golden dragon fast asleep"

"his fires were low in slumber."



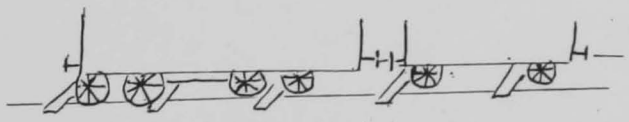
"with wings folded like an immeasurable bat"



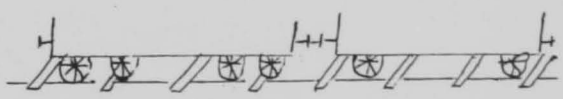
"his long lying on his costly bed."

SKETCHES FOR DIRECTED DRAWING – JUNGLE TRAIN TEXT

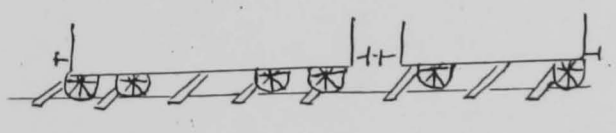
Make sketches to include these details as described in the passage



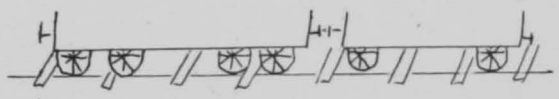
'a train ran through the jungle'



'The carriage was like a cage'



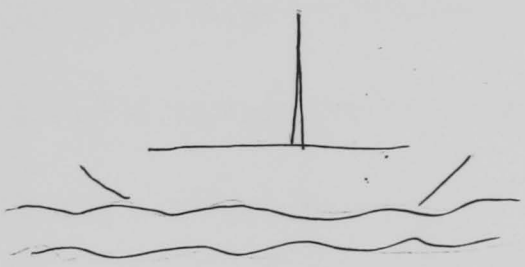
'The mothers lifted up their children'



'The animals seemed to get a lot of fun'

SKETCHES FOR DIRECTED DRAWING – VIKING FEAST TEXT

Make sketches to include these details as described in the passage



'Knut and his warriors sailed back'

'Astrid prepared a huge feast'

"Cows were roasted on spits"

'the longhouse rang'

QUESTIONS ON GOLDEN DRAGON TEXT FOR SUPPLEMENTARY INVESTIGATION

1. Where was the fire?
2. What colour was the dragon?
3. What was the dragon doing?
4. What was the dragon's name?
5. Which word (in story) describes the dragon's bed?
6. Choose one word to describe the dragon.
7. To which creature was the dragon compared?
8. What is a dragon–hoard?
9. How do you know that the dragon had been there for a long time?
10. Why did the treasure seem red?
11. Where was this dragon?
12. What things made up the treasure?
13. Who in this story, had heard of dragon–hoards?
14. What metals are mentioned?
15. Name two types of gems.

FOLLOW-UP STUDY OF PUPIL COMPREHENSION

Reading Ages Recorded on Primary Reading Tests - Level 1 (France, 1979)

Pupil	Reading Age In Years - Form 1	Reading Age In Years - Form 1A	Reading Age In Years Adjusted To Allow For Expected Increase
1	6.5	8.2	7.6
2	6.7	8.2	7.6
3	9.0	9.0	8.4
4	8.2	9.5	8.9
5	7.7	9.2	8.6
6	7.7	9.7	9.1
7	8.0	9.0	8.4
8	6.0	7.5	6.9
9	7.5	9.0	8.4

Significant increase $p<0.01$ (Wilcoxon matched pairs sign-ranked test)

APPENDIX 2

List of Results of Main Study

TABLE 1

Number of errors made by experimental group arranged in categories and according to text using four presentation modes.

Cat. No.	Name of Category	TEXT Dragon	City	Feast	Train	Total	χ^2	p<0.01
1	Extraneous Items	20 (6.2)	16 (6.0)	29 (11.2)	24 (11.0)	89 (8.3)	8.77	NS
2	Predominance of stereotypes	8 (2.5)	19 (7.0)	1 (0.4)	11 (5.0)	39 (3.6)	19.36	p<0.001
3	Influence of previous knowledge	15 (4.6)	51 (19.0)	112 (43.2)	25 (11.5)	203 (19.0)	150.48	p<0.001
4	Confusion of word meanings	5 (1.5)	29 (10.8)	6 (2.3)	0 (0)	40 (3.7)	51.57	p<0.001
5	Discrimination errors	16 (4.9)	10 (3.7)	2 (0.8)	0 (0)	28 (2.6)	17.46	p<0.001
6	Disregard of stated facts	168 (51.9)	104 (38.8)	71 (27.4)	144 (66.0)	487 (45.5)	81.41	p<0.001
7	Literal information	21 (6.5)	5 (1.9)	6 (2.3)	3 (1.4)	35 (3.3)	15.43	p<0.01
8	Reproduction	24 (7.4)	13 (4.9)	10 (3.9)	3 (1.4)	50 (4.7)	11.15	NS
9	Justification	8 (2.5)	5 (1.9)	4 (1.5)	4 (1.8)	21 (2.0)	0.70	NS
10	Transposition	39 (12.0)	16 (6.0)	18 (6.9)	4 (1.8)	77 (7.2)	21.36	p<0.001
	Total	324 (30.3)	268 (25.0)	259 (24.2)	218 (20.4)	1069		

Figures in brackets indicate percentage of total errors and whole numbers indicate actual number of occurrences.

TABLE 2

Number of errors made by experimental group arranged in categories and according to age using four presentation modes.

Cat. No.	Name of Category	CLASS Primary IV	Primary V	Primary VI	Primary VII	Total	χ^2	p<0.01
1	Extraneous Items	33 (10.2)	18 (7.2)	18 (7.3)	20 (8.1)	89 (8.3)	2.24	NS
2	Predominance of stereotypes	11 (3.4)	5 (2.0)	11 (4.4)	12 (4.9)	39 (3.6)	3.55	NS
3	Influence of previous knowledge	61 (24.3)	40 (20.0)	52 (20.7)	50 (20.4)	203 (19.0)	2.48	NS
4	Confusion of word meanings	13 (4.0)	9 (3.6)	8 (3.2)	10 (4.1)	40 (3.7)	0.34	NS
5	Discrimination errors	6 (1.8)	6 (2.3)	8 (3.2)	8 (3.3)	28 (2.6)	1.57	NS
6	Disregard of stated facts	130 (40.0)	136 (54.1)	119 (48.0)	102 (41.6)	487 (45.6)	13.69	p<0.01
7	Literal information	10 (3.1)	7 (2.8)	5 (2.0)	13 (5.3)	35 (3.3)	4.66	NS
8	Reproduction	19 (5.8)	11 (4.3)	9 (3.6)	11 (4.5)	50 (4.7)	1.68	NS
9	Justification	16 (4.9)	2 (0.8)	2 (0.8)	1 (0.4)	21 (2.0)	21.36	p<0.001
10	Transposition	26 (8.0)	17 (6.8)	16 (6.4)	18 (7.3)	77 (7.2)	0.60	NS
	Total	325 (30.4)	251 (23.5)	248 (23.2)	245 (22.9)	1069		

Figures in brackets indicate percentage of total errors and whole numbers indicate actual number of occurrences.

TABLE 3

Number of errors made by experimental group arranged in categories and according to mode of presentation.

Cat. No.	Name of Category	MODE: Writing	MODE: Drawing	Total	χ^2	p<0.01
1	Extraneous Items	48 (11.8)	41 (6.2)	89 (8.3)	9.51	p<0.01
2	Predominance of stereotypes	7 (1.7)	32 (4.8)	39 (3.6)	6.15	NS
3	Influence of previous knowledge	48 (11.8)	155 (23.4)	203 (19.0)	21.64	p<0.001
4	Confusion of word meanings	10 (2.5)	30 (4.5)	40 (3.7)	2.50	NS
5	Discrimination errors	28 (6.9)	0	28 (2.6)	43.93	p<0.001
6	Disregard of stated facts	92 (22.5)	395 (59.8)	487 (45.5)	139.33	p<0.001
7	Literal information	30 (7.4)	5 (0.76)	35 (3.3)	32.61	p<0.001
8	Reproduction	50 (12.3)	0	50 (4.7)	82.25	p<0.001
9	Justification	21 (5.1)	0	21 (2.0)	32.08	p<0.001
10	Transposition	74 (18.1)	3 (0.46)	77 (7.2)	115.39	p<0.001
	Total	408 (38.2)	661 (61.8)	1069		

Figures in brackets indicate percentage of total errors and whole numbers indicate actual number of occurrences.

TABLE 4

Number of errors made by experimental group arranged in categories and according to ability using four presentation modes.

Cat. No.	Name of Category	ABILITY LEVEL: Above Average Ability	ABILITY LEVEL: Below Average Ability	Total	χ^2	p<0.01
1	Extraneous Items	26 (5.8)	63 (10.1)	89 (8.3)	5.96	NS
2	Predominance of stereotypes	17 (3.8)	22 (3.5)	39 (3.6)	1.55	NS
3	Influence of previous knowledge	101 (22.5)	102 (16.4)	203 (19.0)	5.79	NS
4	Confusion of word meanings	15 (3.3)	25 (4.0)	40 (3.7)	0.18	NS
5	Discrimination errors	15 (3.3)	13 (2.1)	28 (2.6)	1.13	NS
6	Disregard of stated facts	203 (45.2)	284 (45.8)	487 (45.7)	0.02	NS
7	Literal information	12 (2.7)	23 (3.7)	35 (3.3)	0.59	NS
8	Reproduction	16 (3.6)	30 (4.8)	46 (4.3)	0.74	NS
9	Justification	7 (1.6)	18 (2.9)	25 (2.3)	1.51	NS
10	Transposition	37 (8.2)	40 (6.4)	77 (7.2)	0.99	NS
	Total	449 (42.0)	620 (58.0)	1069		

Figures in brackets indicate percentage of total errors and whole numbers indicate actual number of occurrences.

TABLE 5

Number of errors made by experimental group arranged in categories according to location using four presentation modes.

Cat. No.	Name of Category	LOCATION Rural	Urban	Total	χ^2	p<0.01
1	Extraneous Items	34 (6.8)	55 (9.7)	89 (8.3)	2.62	NS
2	Predominance of stereotypes	17 (3.4)	22 (3.9)	39 (3.6)	0.07	NS
3	Influence of previous knowledge	96 (19.1)	107 (18.9)	203 (19.0)	7.19	p<0.01
4	Confusion of word meanings	13 (2.6)	27 (4.8)	40 (3.7)	2.91	NS
5	Discrimination errors	11 (2.2)	17 (3.0)	28 (2.6)	0.40	NS
6	Disregard of stated facts	245 (48.8)	242 (42.7)	487 (45.6)	3.78	NS
7	Literal information	19 (3.8)	16 (2.8)	35 (3.3)	0.51	NS
8	Reproduction	20 (3.9)	30 (5.3)	50 (4.7)	0.75	NS
9	Justification	13 (2.6)	8 (1.4)	21 (2.0)	1.36	NS
10	Transposition	34 (6.8)	43 (7.6)	77 (7.2)	0.15	NS
	Total	502 (47.0)	567 (53.0)	1069		

Figures in brackets indicate percentage of total errors and whole numbers indicate actual number of occurrences.

TABLE 6

Number of errors made by above average ability group arranged in categories according to class groups.

Cat. No.	Name of Category	CLASS Primary IV	Primary V	Primary VI	Primary VII	Total	χ^2	p<0.01
1	Extraneous Items	6 (4.2)	6 (6.7)	8 (7.0)	6 (5.6)	26 (5.8)	1.13	NS
2	Predominance of stereotypes	3 (2.1)	1 (1.1)	7 (6.1)	6 (5.6)	17 (3.8)	5.43	NS
3	Influence of previous knowledge	32 (22.7)	22 (25.3)	20 (17.5)	27 (25.2)	101 (22.5)	2.45	NS
4	Confusion of word meanings	8 (5.7)	2 (2.3)	4 (3.5)	1 (0.9)	15 (3.3)	4.60	NS
5	Discrimination errors	3 (2.1)	4 (4.6)	3 (2.6)	5 (4.7)	15 (3.3)	1.83	NS
6	Disregard of stated facts	66 (46.8)	35 (40.2)	59 (51.8)	43 (40.2)	203 (45.2)	4.08	NS
7	Literal information	4 (2.8)	3 (3.4)	0 (0)	5 (4.7)	12 (2.7)	4.99	NS
8	Reproduction	5 (3.5)	4 (4.6)	7 (6.1)	0 (0)	16 (3.6)	6.43	NS
9	Justification	0 (0)	2 (2.3)	1 (0.9)	4 (3.7)	7 (1.6)	6.20	NS
10	Transposition	14 (9.9)	8 (9.1)	5 (4.4)	10 (9.3)	37 (8.2)	1.59	NS
	Total	141 (31.4)	87 (19.5)	114 (25.4)	107 (23.8)	449		

Figures in brackets indicate percentage of total errors and whole numbers indicate actual number of occurrences.

TABLE 7

Number of errors made by below average ability group arranged in categories according to class groups.

Cat. No.	Name of Category	CLASS Primary IV	Primary V	Primary VI	Primary VII	Total	χ^2	p<0.01
1	Extraneous Items	27 (14.7)	12 (7.3)	10 (7.5)	14 (10.1)	63 (10.1)	6.63	NS
2	Predominance of stereotypes	8 (4.3)	4 (2.4)	4 (3.0)	6 (4.3)	22 (3.5)	1.32	NS
3	Influence of previous knowledge	29 (15.8)	18 (11.0)	32 (23.9)	23 (16.7)	102 (16.4)	9.03	NS
4	Confusion of word meanings	5 (2.7)	7 (4.3)	4 (3.0)	9 (6.5)	25 (4.0)	3.44	NS
5	Discrimination errors	3 (1.6)	2 (1.2)	5 (3.7)	3 (2.2)	13 (2.1)	2.56	NS
6	Disregard of stated facts	64 (34.8)	101 (61.6)	60 (44.8)	59 (42.8)	284 (45.8)	26.03	p<0.001
7	Literal information	6 (3.3)	4 (2.4)	5 (3.7)	8 (5.8)	23 (3.7)	2.53	NS
8	Reproduction	14 (7.6)	7 (4.3)	2 (1.5)	7 (5.1)	30 (4.8)	6.46	NS
9	Justification	16 (8.7)	0 (0)	1 (0.7)	1 (0.7)	18 (2.9)	31.34	p<0.001
10	Transposition	12 (6.5)	9 (5.5)	11 (8.2)	8 (5.8)	40 (6.4)	1.04	NS
	Total	184 (29.7)	164 (26.5)	134 (21.6)	138 (22.8)	620		

Figures in brackets indicate percentage of total errors and whole numbers indicate actual number of occurrences.

TABLE 8

Number of errors made in the directed writing mode arranged in categories according to class groups.

Cat. No.	Name of Category	CLASS Primary IV	Primary V	Primary VI	Primary VII	Total	χ^2	p<0.01
1	Extraneous Items	1 (1.4)	0 (0)	1 (2.7)	0 (0)	2 (1.0)	1.89	NS
2	Predominance of stereotypes	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0	NS
3	Influence of previous knowledge	11 (15.0)	4 (11.1)	6 (16.2)	7 (15.9)	28 (14.7)	0.50	NS
4	Confusion of word meanings	4 (5.4)	0 (0)	0 (0)	1 (2.3)	5 (2.6)	4.26	NS
5	Discrimination errors	4 (5.4)	5 (13.9)	6 (16.2)	6 (13.6)	21 (11.1)	3.90	NS
6	Disregard of stated facts	25 (34.2)	13 (36.1)	12 (32.4)	11 (25.0)	61 (32.1)	1.51	NS
7	Literal information	6 (8.2)	4 (11.1)	2 (5.4)	7 (15.9)	19 (10.0)	2.88	NS
8	Reproduction	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0	NS
9	Justification	7 (9.6)	0 (0)	0 (0)	0 (0)	7 (3.7)	11.65	p<0.01
10	Transposition	15 (20.0)	10 (27.7)	10 (27.0)	12 (27.8)	47 (24.7)	1.12	NS
	Total	73 (38.4)	36 (18.9)	37 (19.5)	44 (23.2)	190		

Figures in brackets indicate percentage of total errors and whole numbers indicate actual number of occurrences.

TABLE 9

Number of errors made in the directed drawing mode arranged in categories according to class groups.

Cat. No.	Name of Category	CLASS Primary IV	Primary V	Primary VI	Primary VII	Total	χ^2	p<0.01
1	Extraneous Items	1 (1.4)	0 (0)	0 (0)	0 (0)	1 (0.4)	2.47	NS
2	Predominance of stereotypes	4 (5.4)	1 (1.6)	0 (0)	0 (0)	5 (1.9)	7.01	NS
3	Influence of previous knowledge	23 (31.1)	11 (17.2)	26 (42.6)	17 (29.8)	77 (30.1)	9.66	NS
4	Confusion of word meanings	7 (9.5)	7 (10.9)	7 (11.5)	6 (10.5)	27 (10.5)	0.16	NS
5	Discrimination errors	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0	NS
6	Disregard of stated facts	35 (47.3)	43 (67.2)	28 (45.9)	32 (56.1)	138 (53.9)	7.53	NS
7	Literal information	1 (1.4)	2 (3.2)	0 (0)	2 (3.5)	5 (1.9)	2.53	NS
8	Reproduction	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0	NS
9	Justification	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0	NS
10	Transposition	3 (4.0)	0 (0)	0 (0)	0 (0)	3 (1.2)	7.47	NS
	Total	74 (29.0)	64 (25.0)	61 (23.9)	57 (22.3)	256		

Figures in brackets indicate percentage of total errors and whole numbers indicate actual number of occurrences.

TABLE 10

Number of errors made in the free drawing mode arranged in categories according to class groups.

Cat. No.	Name of Category	CLASS Primary IV	Primary V	Primary VI	Primary VII	Total	χ^2	p<0.01
1	Extraneous Items	13 (12.6)	13 (11.8)	8 (7.8)	6 (6.6)	40 (9.9)	2.85	NS
2	Predominance of stereotypes	5 (4.9)	3 (2.7)	10 (9.8)	9 (10.0)	27 (6.7)	6.51	NS
3	Influence of previous knowledge	21 (20.4)	22 (20.0)	14 (13.7)	21 (23.3)	78 (19.3)	3.09	NS
4	Confusion of word meanings	0 (0)	1 (0.9)	0 (0)	2 (2.2)	3 (0.7)	4.26	NS
5	Discrimination errors	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0	NS
6	Disregard of stated facts	64 (62.1)	71 (64.5)	70 (68.6)	52 (57.7)	257 (63.5)	2.56	NS
7	Literal information	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0	NS
8	Reproduction	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0	NS
9	Justification	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0	NS
10	Transposition	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0	NS
	Total	103 (25.4)	110 (27.2)	102 (25.2)	90 (22.2)	405		

Figures in brackets indicate percentage of total errors and whole numbers indicate actual number of occurrences.

TABLE 11

Number of errors made in the free writing mode arranged in categories according to class groups.

Cat. No.	Name of Category	CLASS Primary IV	Primary V	Primary VI	Primary VII	Total	χ^2	p<0.01
1	Extraneous Items	18 (24.0)	5 (12.2)	9 (18.8)	14 (25.9)	46 (21.1)	3.25	NS
2	Predominance of stereotypes	2 (2.6)	1 (2.4)	1 (2.1)	3 (5.5)	7 (3.2)	1.30	NS
3	Influence of previous knowledge	6 (8.0)	3 (7.3)	6 (12.5)	5 (9.3)	20 (9.2)	1.02	NS
4	Confusion of word meanings	2 (2.6)	1 (2.4)	1 (2.1)	1 (1.9)	5 (2.3)	0.11	NS
5	Discrimination errors	2 (2.6)	1 (2.4)	2 (4.2)	2 (3.7)	7 (3.2)	0.38	NS
6	Disregard of stated facts	6 (8.0)	9 (22.0)	9 (18.8)	7 (13.0)	31 (14.2)	5.27	NS
7	Literal information	3 (4.0)	1 (2.4)	3 (6.3)	4 (7.4)	11 (5.0)	1.53	NS
8	Reproduction	19 (25.3)	11 (26.8)	9 (18.8)	11 (20.4)	50 (22.9)	1.27	NS
9	Justification	9 (12.0)	2 (4.8)	2 (4.2)	1 (1.9)	14 (6.4)	6.33	NS
10	Transposition	8 (10.6)	7 (17.1)	6 (12.5)	6 (11.1)	27 (12.4)	1.12	NS
	Total	75 (34.4)	41 (18.8)	48 (22.0)	54 (24.8)	218		

Figures in brackets indicate percentage of total errors and whole numbers indicate actual number of occurrences.

TABLE 12

Number of errors made on dragon text arranged in categories according to class groups.

Cat. No.	Name of Category	CLASS Primary IV	Primary V	Primary VI	Primary VII	Total	χ^2	p<0.01
1	Extraneous Items	4 (4.8)	5 (6.6)	4 (5.3)	7 (8.0)	20 (6.2)	0.90	NS
2	Predominance of stereotypes	3 (3.6)	0 (0)	2 (2.6)	3 (3.4)	8 (2.5)	2.68	NS
3	Influence of previous knowledge	3 (3.6)	3 (3.9)	3 (3.9)	6 (6.8)	15 (4.6)	1.33	NS
4	Confusion of word meanings	0 (0)	1 (1.3)	1 (1.3)	3 (3.4)	5 (1.5)	3.38	NS
5	Discrimination errors	3 (3.6)	5 (6.6)	2 (2.6)	6 (6.8)	16 (4.9)	2.29	NS
6	Disregard of stated facts	42 (50.0)	44 (57.9)	46 (60.5)	36 (41.0)	168 (51.9)	7.74	NS
7	Literal information	7 (8.3)	5 (6.6)	2 (2.6)	7 (8.0)	21 (6.5)	2.65	NS
8	Reproduction	7 (8.3)	4 (5.3)	6 (7.9)	7 (8.0)	24 (7.4)	0.68	NS
9	Justification	7 (8.3)	1 (1.3)	0 (0)	0 (0)	8 (2.5)	16.57	p<0.001
10	Transposition	8 (9.5)	8 (10.5)	10 (13.2)	13 (14.8)	39 (12.0)	1.38	NS
	Total	84 (25.9)	76 (23.5)	76 (23.5)	88 (27.2)	324		

Figures in brackets indicate percentage of total errors and whole numbers indicate actual number of occurrences.

TABLE 13

Number of errors made on city text arranged in categories according to class groups.

Cat. No.	Name of Category	CLASS Primary IV	Primary V	Primary VI	Primary VII	Total	χ^2	p<0.01
1	Extraneous Items	8 (9.2)	2 (3.8)	3 (4.5)	3 (4.8)	16 (6.0)	2.43	NS
2	Predominance of stereotypes	2 (2.3)	3 (5.8)	6 (9.1)	8 (12.7)	19 (7.1)	6.58	NS
3	Influence of previous knowledge	21 (24.1)	10 (19.2)	13 (19.7)	7 (11.1)	51 (19.0)	4.06	NS
4	Confusion of word meanings	8 (9.2)	7 (13.5)	7 (10.6)	7 (11.1)	29 (10.8)	0.45	NS
5	Discrimination errors	1 (1.1)	1 (1.9)	6 (9.1)	2 (3.2)	10 (3.7)	7.42	NS
6	Disregard of stated facts	26 (29.9)	25 (48.1)	24 (36.4)	29 (46.0)	104 (38.8)	6.35	NS
7	Literal information	1 (1.1)	0 (0)	1 (1.5)	3 (4.8)	5 (1.9)	4.16	NS
8	Reproduction	7 (8.0)	2 (3.8)	2 (3.0)	2 (3.2)	13 (4.9)	2.90	NS
9	Justification	4 (4.6)	1 (1.9)	0 (0)	0 (0)	5 (1.9)	6.00	NS
10	Transposition	9 (10.3)	1 (1.9)	4 (6.1)	2 (3.2)	16 (6.0)	5.36	NS
	Total	87 (32.5)	52 (19.4)	66 (24.6)	63 (23.5)	268		

Figures in brackets indicate percentage of total errors and whole numbers indicate actual number of occurrences.

TABLE 14

Number of errors made on feast text arranged in categories according to class groups.

Cat. No.	Name of Category	CLASS Primary IV	Primary V	Primary VI	Primary VII	Total	χ^2	p<0.01
1	Extraneous Items	5 (6.8)	9 (12.9)	7 (12.5)	8 (13.6)	29 (11.2)	2.09	NS
2	Predominance of stereotypes	0 (0)	0 (0)	0 (0)	1 (1.7)	1 (0.4)	3.40	NS
3	Influence of previous knowledge	31 (41.9)	23 (32.9)	28 (50.0)	30 (50.9)	112 (43.2)	5.56	NS
4	Confusion of word meanings	5 (6.8)	1 (1.4)	0 (0)	0 (0)	6 (2.3)	9.42	NS
5	Discrimination errors	2 (2.7)	0 (0)	0 (0)	0 (0)	2 (0.8)	5.04	NS
6	Disregard of stated facts	14 (18.9)	27 (38.6)	17 (30.4)	13 (22.0)	71 (27.4)	8.17	NS
7	Literal information	0 (0)	2 (2.9)	1 (1.8)	3 (5.1)	6 (2.3)	3.91	NS
8	Reproduction	5 (6.8)	2 (2.9)	1 (1.8)	2 (3.4)	10 (3.9)	2.55	NS
9	Justification	3 (4.0)	0 (0)	1 (1.8)	0 (0)	4 (1.5)	5.11	NS
10	Transposition	9 (12.1)	6 (8.6)	1 (1.8)	2 (3.4)	18 (6.9)	6.86	NS
	Total	74 (28.6)	70 (27.0)	56 (21.6)	59 (22.8)	259		

Figures in brackets indicate percentage of total errors and whole numbers indicate actual number of occurrences.

TABLE 15

Number of errors made on train text arranged in categories according to class groups.

Cat. No.	Name of Category	CLASS Primary IV	Primary V	Primary VI	Primary VII	Total	χ^2	p<0.01
1	Extraneous Items	16 (20.0)	2 (3.8)	4 (8.0)	2 (5.7)	24 (11.0)	10.90	NS
2	Predominance of stereotypes	6 (7.5)	2 (3.8)	3 (6.0)	0 (0)	11 (5.0)	3.14	NS
3	Influence of previous knowledge	6 (7.5)	4 (7.5)	8 (16.0)	7 (20.0)	25 (11.5)	5.56	NS
4	Confusion of word meanings	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0	NS
5	Discrimination errors	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0	NS
6	Disregard of stated facts	48 (60.0)	40 (75.5)	32 (64.0)	24 (68.6)	144 (66.0)	3.60	NS
7	Literal information	2 (2.5)	0 (0)	1 (2.0)	0 (0)	3 (1.4)	2.12	NS
8	Reproduction	0 (0)	3 (5.7)	0 (0)	0 (0)	3 (1.4)	9.47	NS
9	Justification	2 (2.5)	0 (0)	1 (2.0)	1 (2.9)	4 (1.8)	1.40	NS
10	Transposition	0 (0)	2 (3.8)	1 (2.0)	1 (2.9)	4 (1.8)	2.81	NS
	Total	80 (36.7)	53 (24.3)	50 (22.9)	35 (16.0)	218		

Figures in brackets indicate percentage of total errors and whole numbers indicate actual number of occurrences.

TABLE 16

Number of errors made by rural group arranged in categories according to class groups.

Cat. No.	Name of Category	CLASS Primary IV	Primary V	Primary VI	Primary VII	Total	χ^2	p<0.01
1	Extraneous Items	4 (3.0)	12 (10.1)	7 (5.8)	11 (8.7)	34 (6.8)	6.07	NS
2	Predominance of stereotypes	3 (2.2)	2 (1.7)	5 (4.1)	7 (5.5)	17 (3.4)	3.58	NS
3	Influence of previous knowledge	24 (17.8)	16 (13.4)	29 (24.0)	27 (21.3)	96 (19.1)	4.85	NS
4	Confusion of word meanings	3 (2.2)	0 (0)	2 (1.7)	8 (6.3)	13 (2.6)	10.58	NS
5	Discrimination errors	3 (2.2)	2 (1.7)	3 (2.5)	3 (2.4)	11 (2.2)	0.21	NS
6	Disregard of stated facts	65 (48.1)	76 (63.9)	58 (47.9)	46 (36.2)	245 (48.8)	18.91	p<0.001
7	Literal information	5 (3.7)	4 (3.4)	3 (2.5)	7 (5.5)	19 (3.8)	1.67	NS
8	Reproduction	9 (6.7)	2 (1.7)	2 (1.7)	7 (5.5)	20 (4.0)	6.68	NS
9	Justification	11 (8.1)	0 (0)	2 (1.7)	0 (0)	13 (2.6)	23.50	p<0.001
10	Transposition	8 (5.9)	5 (4.2)	10 (8.3)	11 (8.7)	34 (6.8)	2.54	NS
	Total	135 (26.9)	119 (23.7)	121 (24.1)	127 (25.3)	502		

Figures in brackets indicate percentage of total errors and whole numbers indicate actual number of occurrences.

TABLE 17

Number of errors made by urban group arranged in categories according to class groups.

Cat. No.	Name of Category	CLASS Primary IV	Primary V	Primary VI	Primary VII	Total	χ^2	p<0.01
1	Extraneous Items	29 (15.3)	6 (4.5)	11 (8.7)	9 (7.6)	55 (9.7)	11.45	p<0.01
2	Predominance of stereotypes	8 (4.2)	3 (2.3	6 (4.7)	5 (4.2)	22 (3.9)	1.25	NS
3	Influence of previous knowledge	37 (19.5)	24 (18.2)	23 (18.1)	23 (19.5)	107 (18.9)	0.16	NS
4	Confusion of word meanings	10 (5.3)	9 (6.8)	6 (4.7)	2 (1.7)	27 (4.8)	3.78	NS
5	Discrimination errors	3 (1.6)	4 (3.0)	5 (3.9)	5 (4.2)	17 (3.0)	2.32	NS
6	Disregard of stated facts	65 (34.2)	60 (45.5)	61 (48.0)	56 (47.5)	242 (42.7)	8.57	NS
7	Literal information	5 (2.6)	3 (2.3)	2 (1.6)	6 (5.1)	16 (2.8)	3.09	NS
8	Reproduction	10 (5.3)	9 (6.8)	7 (5.5)	4 (3.4)	30 (5.3)	1.48	NS
9	Justification	5 (2.6)	4 (3.0)	0 (0)	1 (0.8)	10 (1.8)	4.90	NS
10	Transposition	18 (9.5)	10 (7.6)	6 (4.7)	7 (5.9)	41 (7.2)	3.13	NS
	Total	190 (33.5)	132 (23.3)	127 (22.4)	118 (20.8)	567		

Figures in brackets indicate percentage of total errors and whole numbers indicate actual number of occurrences.

TABLE 18

Number of errors made by above average ability group arranged in categories according to text.

Cat. No.	Name of Category	TEXT Dragon	City	Feast	Train	Total	χ^2	p<0.01
1	Extraneous Items	11 (7.2)	6 (5.4)	5 (5.1)	4 (4.7)	26 (5.8)	0.87	NS
2	Predominance of stereotypes	4 (2.6)	8 (7.1)	1 (1.0)	4 (4.7)	17 (3.8)	6.33	NS
3	Influence of previous knowledge	9 (5.9)	26 (23.2)	60 (60.6)	6 (7.1)	101 (22.5)	118.35	p<0.001
4	Confusion of word meanings	0 (0)	12 (10.7)	3 (3.0)	0 (0)	15 (3.3)	27.11	p<0.001
5	Discrimination errors	10 (6.5)	4 (3.6)	1 (1.0)	0 (0)	15 (3.3)	9.46	NS
6	Disregard of stated facts	78 (51.0)	35 (31.3)	22 (22.2)	68 (80.0)	203 (45.2)	73.52	p<0.001
7	Literal information	9 (5.9)	0 (0)	2 (2.0)	1 (1.2)	12 (2.7)	5.05	NS
8	Reproduction	11 (7.2)	8 (7.1)	2 (2.0)	0 (0)	21 (4.7)	9.43	NS
9	Justification	1 (0.7)	1 (0.9)	1 (1.0)	1 (1.2)	4 (0.9)	0.19	NS
10	Transposition	20 (13.1)	12 (10.7)	2 (2.0)	1 (1.2)	35 (7.8)	17.03	p<0.001
	Total	153 (34.4)	112 (25.0)	99 (22.0)	85 (18.9)	449		

Figures in brackets indicate percentage of total errors and whole numbers indicate actual number of occurrences.

TABLE 19

Number of errors made by below average ability group arranged in categories according to text.

Cat. No.	Name of Category	TEXT Dragon	City	Feast	Train	Total	χ^2	p<0.01
1	Extraneous Items	9 (5.3)	10 (6.4)	24 (15.0)	20 (15.0)	63 (10.2)	14.47	p<0.01
2	Predominance of stereotypes	4 (2.3)	11 (7.1)	0 (0)	7 (5.3)	22 (3.5)	13.35	p<0.01
3	Influence of previous knowledge	6 (3.5)	25 (16.0)	52 (32.5)	19 (14.3)	102 (16.5)	51.30	p<0.001
4	Confusion of word meanings	5 (2.9)	17 (10.9)	3 (1.9)	0 (0)	25 (4.0)	27.06	p<0.001
5	Discrimination errors	6 (3.5)	22 (14.1)	1 (0.6)	0 (0)	29 (4.8)	44.02	p<0.001
6	Disregard of stated facts	90 (52.6)	54 (34.6)	49 (30.6)	76 (57.1)	269 (43.4)	31.70	p<0.001
7	Literal information	12 (7.0)	4 (2.6)	4 (2.5)	2 (1.5)	22 (3.5)	8.59	NS
8	Reproduction	13 (7.6)	5 (3.2)	9 (5.6)	3 (2.3)	30 (4.8)	5.88	NS
9	Justification	7 (4.1)	4 (2.6)	4 (2.5)	3 (2.3)	18 (2.9)	1.21	NS
10	Transposition	19 (11.1)	4 (2.6)	14 (8.8)	3 (2.3)	40 (6.5)	15.34	p<0.01
	Total	171 (27.6)	156 (25.2)	160 (25.8)	133 (21.5)	620		

Figures in brackets indicate percentage of total errors and whole numbers indicate actual number of occurrences.

TABLE 20

Number of errors made by above average ability group arranged in categories according to mode of presentation.

Cat. No.	Name of Category	MODE OF PRESENTATION: Free Writing	Directed Writing	Free Drawing	Directed Drawing	Total	χ^2	p<0.01
1	Extraneous Items	16 (18.4)	0 (0)	9 (4.9)	0 (0)	25 (5.1)	44.07	p<0.001
2	Predominance of stereotypes	2 (2.3)	0 (0)	12 (6.5)	2 (1.4)	16 (3.2)	10.78	NS
3	Influence of previous knowledge	8 (9.2)	14 (17.9)	41 (22.3)	39 (26.9)	102 (20.6)	11.07	NS
4	Confusion of word meanings	3 (3.4)	1 (1.3)	0 (0)	16 (11.0)	20 (4.0)	27.60	p<0.001
5	Discrimination errors	4 (4.6)	11 (14.1)	0 (0)	0 (0)	15 (3.0)	43.47	p<0.001
6	Disregard of stated facts	16 (18.4)	23 (29.5)	122 (66.3)	85 (58.6)	246 (49.8)	71.77	p<0.001
7	Literal information	2 (2.3)	8 (10.3)	0 (0)	3 (2.1)	13 (2.6)	22.89	p<0.001
8	Reproduction	20 (23.0)	0 (0)	0 (0)	0 (0)	20 (4.0)	97.51	p<0.001
9	Justification	3 (3.4)	0 (0)	0 (0)	0 (0)	3 (0.6)	14.12	p<0.01
10	Transposition	13 (14.9)	21 (26.9)	0 (0)	0 (0)	34 (6.9)	82.02	p<0.001
	Total	87 (17.6)	78 (15.8)	184 (37.2)	145 (29.4)	494		

Figures in brackets indicate percentage of total errors and whole numbers indicate actual number of occurrences.

TABLE 21

Number of errors made by above below average ability group arranged in categories according to mode of presentation.

Cat. No.	Name of Category	MODE OF PRESENTATION: Free Writing	Directed Writing	Free Drawing	Directed Drawing	Total	χ^2	p<0.01
1	Extraneous Items	30 (22.9)	2 (1.8)	31 (14.0)	1 (0.9)	64 (11.1)	41.85	p<0.001
2	Predominance of stereotypes	5 (3.8)	0 (0)	15 (6.8)	3 (2.7)	23 (4.0)	9.64	NS
3	Influence of previous knowledge	12 (9.2)	14 (12.5)	37 (16.7)	38 (34.2)	101 (17.6)	29.78	p<0.001
4	Confusion of word meanings	2 (1.5)	4 (3.6)	3 (1.4)	11 (9.9)	20 (3.5)	18.13	p<0.001
5	Discrimination errors	3 (2.3)	10 (8.9)	0 (0)	0 (0)	13 (2.3)	30.21	p<0.001
6	Disregard of stated facts	15 (11.5)	38 (33.9)	135 (61.1)	53 (47.7)	241 (41.9)	87.79	p<0.001
7	Literal information	9 (6.8)	11 (9.8)	0 (0)	2 (1.8)	22 (3.8)	24.27	p<0.001
8	Reproduction	30 (22.9)	0 (0)	0 (0)	0 (0)	30 (5.2)	107.28	p<0.001
9	Justification	11 (8.4)	7 (6.3)	0 (0)	0 (0)	18 (3.1)	26.31	p<0.001
10	Transposition	14 (10.7)	26 (23.2)	0 (0)	3 (2.7)	43 (7.5)	63.55	p<0.001
	Total	131 (22.8)	112 (19.5)	221 (38.4)	111 (19.3)	575		

Figures in brackets indicate percentage of total errors and whole numbers indicate actual number of occurrences.

TABLE 22

Number of errors arranged in categories according to ability and location using four presentation modes.

Cat. No.	Name of Category	ABILITY AND LOCATION: Above Average Rural	Below Average Rural	Above Average Urban	Below Average Urban	Total	χ^2	p<0.01
1	Extraneous Items	11 (5.0)	23 (8.1)	15 (6.5)	40 (11.9)	89 (8.3)	9.67	NS
2	Predominance of stereotypes	6 (2.7)	11 (3.9)	11 (4.8)	11 (3.3)	39 (3.6)	1.54	NS
3	Influence of previous knowledge	47 (21.5)	49 (17.3)	54 (23.5)	53 (15.7)	203 (19.0)	6.73	NS
4	Confusion of word meanings	3 (1.4)	10 (3.5)	12 (5.2)	15 (4.5)	40 (3.7)	5.32	NS
5	Discrimination errors	4 (1.8)	7 (2.5)	11 (4.8)	6 (1.8)	28 (2.6)	5.71	NS
6	Disregard of stated facts	131 (60.0)	114 (40.3)	72 (31.3)	170 (50.4)	487 (45.5)	43.21	p<0.001
7	Literal information	3 (1.4)	16 (5.7)	9 (3.9)	7 (2.1)	35 (3.3)	9.39	NS
8	Reproduction	2 (0.9)	18 (6.4)	18 (7.8)	12 (3.6)	50 (4.7)	14.81	p<0.01
9	Justification	1 (0.5)	12 (4.2)	2 (0.9)	6 (1.8)	21 (2.0)	11.68	p<0.01
10	Transposition	11 (5.0)	23 (8.1)	26 (11.3)	17 (5.0)	77 (7.2)	10.06	NS
	Total	219 (20.5)	283 (26.5)	230 (21.5)	337 (31.5)	1069		

Figures in brackets indicate percentage of total errors and whole numbers indicate actual number of occurrences.

TABLE 23

Number of errors made on city text arranged in categories according to mode of presentation.

Cat. No.	Name of Category	MODE OF PRESENTATION: Free Writing	Directed Writing	Free Drawing	Directed Drawing	Total	χ^2	p<0.01
1	Extraneous Items	3 (5.7)	0 (0)	13 (13.8)	0 (0)	16 (6.0)	18.04	p<0.001
2	Predominance of stereotypes	2 (3.8)	0 (0)	17 (18.1)	0 (0)	19 (7.1)	27.37	p<0.001
3	Influence of previous knowledge	5 (9.4)	21 (63.6)	14 (14.9)	11 (12.5)	51 (19.0)	49.26	p<0.001
4	Confusion of word meanings	4 (7.5)	1 (3.0)	3 (3.2)	21 (23.9)	29 (10.8)	23.85	p<0.001
5	Discrimination errors	3 (5.7)	7 (21.2)	0 (0)	0 (0)	10 (3.7)	35.68	p<0.001
6	Disregard of stated facts	5 (9.4)	0 (0)	47 (50.0)	52 (59.1)	104 (38.8)	60.39	p<0.001
7	Literal information	4 (7.5)	0 (0)	0 (0)	1 (1.1)	5 (1.9)	12.01	p<0.01
8	Reproduction	13 (24.5)	0 (0)	0 (0)	0 (0)	13 (4.9)	55.42	p<0.001
9	Justification	5 (9.4)	0 (0)	0 (0)	0 (0)	5 (1.9)	20.67	p<0.001
10	Transposition	9 (17.0)	4 (12.1)	0 (0)	3 (3.4)	16 (6.0)	20.67	p<0.001
	Total	53 (19.8)	33 (12.3)	94 (35.1)	88 (32.8)	268		

Figures in brackets indicate percentage of total errors and whole numbers indicate actual number of occurrences.

TABLE 24

Number of errors made on dragon text arranged in categories according to mode of presentation.

Cat. No.	Name of Category	MODE OF PRESENTATION: Free Writing	Directed Writing	Free Drawing	Directed Drawing	Total	χ^2	p<0.01
1	Extraneous Items	14 (23.0)	0 (0)	6 (4.4)	0 (0)	20 (6.2)	38.73	p<0.001
2	Predominance of stereotypes	0 (0)	0 (0)	7 (5.1)	1 (1.8)	8 (2.5)	7.50	NS
3	Influence of previous knowledge	2 (3.3)	0 (0)	3 (2.2)	10 (17.9)	15 (4.6)	27.70	p<0.001
4	Confusion of word meanings	1 (1.6)	1 (1.4)	0 (0)	3 (5.4)	5 (1.5)	7.50	NS
5	Discrimination errors	2 (3.3)	14 (19.7)	0 (0)	0 (0)	16 (4.9)	43.37	p<0.001
6	Disregard of stated facts	6 (9.8)	0 (0)	120 (88.2)	42 (75.0)	168 (51.9)	203.73	p<0.001
7	Literal information	3 (4.9)	18 (25.4)	0 (0)	0 (0)	21 (6.5)	55.26	p<0.001
8	Reproduction	24 (39.3)	0 (0)	0 (0)	0 (0)	24 (7.4)	111.75	p<0.001
9	Justification	1 (1.6)	7 (9.9)	0 (0)	0 (0)	8 (2.5)	21.14	p<0.001
10	Transposition	8 (13.1)	31 (43.7)	0 (0)	0 (0)	39 (12.0)	93.40	p<0.001
	Total	61 (18.8)	71 (21.9)	136 (42.0)	56 (17.3)	324		

Figures in brackets indicate percentage of total errors and whole numbers indicate actual number of occurrences.

TABLE 25

Number of errors made on feast text arranged in categories according to mode of presentation.

Cat. No.	Name of Category	MODE OF PRESENTATION: Free Writing	Directed Writing	Free Drawing	Directed Drawing	Total	χ^2	p<0.01
1	Extraneous Items	12 (26.7)	0 (0)	16 (13.7)	1 (1.4)	29 (11.2)	21.68	p<0.001
2	Predominance of stereotypes	1 (2.2)	0 (0)	0 (0)	0 (0)	1 (0.4)	4.77	NS
3	Influence of previous knowledge	4 (8.9)	6 (21.4)	54 (46.1)	48 (69.6)	112 (43.2)	46.95	p<0.001
4	Confusion of word meanings	0 (0)	3 (10.7)	0 (0)	3 (4.3)	6 (2.3)	13.83	p<0.01
5	Discrimination errors	2 (4.4)	0 (0)	0 (0)	0 (0)	2 (0.8)	9.59	NS
6	Disregard of stated facts	5 (11.1)	6 (21.4)	47 (40.2)	13 (18.8)	71 (27.4)	18.63	p<0.001
7	Literal information	1 (2.2)	1 (3.6)	0 (0)	4 (5.8)	6 (2.3)	6.66	NS
8	Reproduction	10 (22.2)	0 (0)	0 (0)	0 (0)	10 (3.9)	49.47	p<0.001
9	Justification	4 (8.9)	0 (0)	0 (0)	0 (0)	4 (1.5)	19.32	p<0.001
10	Transposition	6 (13.3)	12 (42.9)	0 (0)	0 (0)	18 (6.9)	72.55	p<0.001
	Total	45 (17.4)	28 (10.8)	117 (45.2)	69 (26.6)	259		

Figures in brackets indicate percentage of total errors and whole numbers indicate actual number of occurrences.

TABLE 26

Number of errors made on train text arranged in categories according to mode of presentation.

Cat. No.	Name of Category	MODE OF PRESENTATION: Free Writing	Directed Writing	Free Drawing	Directed Drawing	Total	χ^2	p<0.01
1	Extraneous Items	17 (28.8)	2 (3.4)	5 (8.6)	0 (0)	24 (11.0)	28.13	p<0.001
2	Predominance of stereotypes	4 (6.8)	0 (0)	3 (5.2)	4 (9.3)	11 (5.0)	5.08	NS
3	Influence of previous knowledge	9 (15.3)	1 (1.7)	7 (12.1)	8 (18.6)	25 (11.5)	8.43	NS
4	Confusion of word meanings	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0	NS
5	Discrimination errors	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0	NS
6	Disregard of stated facts	15 (25.4)	55 (94.8)	43 (74.1)	31 (72.1)	144 (66.1)	21.44	p<0.001
7	Literal information	3 (5.1)	0 (0)	0 (0)	0 (0)	3 (1.4)	8.20	NS
8	Reproduction	3 (6.8)	0 (0)	0 (0)	0 (0)	3 (1.4)	8.20	NS
9	Justification	4 (6.8)	0 (0)	0 (0)	0 (0)	4 (1.8)	10.98	NS
10	Transposition	4 (6.8)	0 (0)	0 (0)	0 (0)	4 (1.8)	10.98	NS
	Total	59 (27.1)	58 (26.6)	58 (26.6)	43 (19.7)	218		

Figures in brackets indicate percentage of total errors and whole numbers indicate actual number of occurrences.

TABLE 27

Number of errors made by urban pupils arranged in categories according to text.

Cat. No.	Name of Category	TEXT Dragon	City	Feast	Train	Total	χ^2	p<0.01
1	Extraneous Items	13 (7.8)	13 (10.0)	12 (8.9)	17 (13.9)	55 (9.7)	3.39	NS
2	Predominance of stereotypes	4 (2.4)	9 (6.3)	1 (0.7)	8 (6.6)	22 (3.9)	9.13	NS
3	Influence of previous knowledge	8 (4.8)	25 (17.5)	62 (46.0)	12 (9.8)	107 (18.9)	92.85	p<0.001
4	Confusion of word meanings	3 (1.8)	18 (12.6)	6 (4.4)	0 (0)	27 (4.8)	28.68	p<0.001
5	Discrimination errors	10 (6.0)	6 (4.2)	1 (0.7)	0 (0)	17 (3.0)	11.97	p<0.01
6	Disregard of stated facts	88 (52.7)	51 (35.7)	29 (21.5)	74 (60.7)	242 (42.7)	50.63	p<0.001
7	Literal information	9 (5.4)	5 (3.5)	0 (0)	2 (1.6)	16 (2.8)	8.79	NS
8	Reproduction	11 (6.6)	8 (5.6)	8 (5.9)	3 (2.5)	30 (5.3)	2.65	NS
9	Justification	1 (0.6)	1 (0.7)	3 (2.2)	3 (2.5)	8 (1.4)	2.91	NS
10	Transposition	20 (12.0)	7 (4.9)	13 (9.6)	3 (2.5)	43 (7.6)	11.45	p<0.01
	Total	167 (29.5)	143 (25.2)	135 (23.8)	122 (21.5)	567		

Figures in brackets indicate percentage of total errors and whole numbers indicate actual number of occurrences.

TABLE 28

Number of errors made by rural pupils arranged in categories according to text.

Cat. No.	Name of Category	TEXT Dragon	City	Feast	Train	Total	χ^2	p<0.01
1	Extraneous Items	7 (4.5)	3 (2.4)	17 (13.7)	7 (7.3)	34 (6.8)	14.61	p<0.01
2	Predominance of stereotypes	4 (2.5)	10 (8.0)	0 (0)	3 (3.1)	17 (3.4)	12.84	p<0.01
3	Influence of previous knowledge	7 (4.5)	26 (20.8)	50 (40.3)	13 (13.5)	96 (19.1)	60.02	p<0.001
4	Confusion of word meanings	2 (1.3)	11 (8.8)	0 (0)	0 (0)	13 (2.6)	26.04	p<0.001
5	Discrimination errors	6 (3.8)	4 (3.2)	1 (0.8)	0 (0)	11 (2.2)	5.80	NS
6	Disregard of stated facts	80 (51.0)	53 (42.4)	42 (33.9)	70 (72.9)	245 (48.8)	35.75	p<0.001
7	Literal information	12 (7.6)	0 (0)	6 (4.8)	1 (1.0)	19 (3.8)	13.70	p<0.01
8	Reproduction	13 (8.3)	5 (4.0)	2 (1.6)	0 (0)	20 (3.9)	13.38	p<0.01
9	Justification	7 (4.5)	4 (3.2)	1 (0.8)	1 (1.0)	13 (2.6)	4.83	NS
10	Transposition	19 (12.1)	9 (7.2)	5 (4.0)	1 (1.0)	34 (6.8)	13.59	p<0.01
	Total	157 (31.3)	125 (24.9)	124 (24.7)	96 (19.1)	502		

Figures in brackets indicate percentage of total errors and whole numbers indicate actual number of occurrences.

TABLE 29

Number of errors made by rural group arranged in categories according to mode of presentation.

Cat. No.	Name of Category	MODE OF PRESENTATION: Free Writing	Directed Writing	Free Drawing	Directed Drawing	Total	χ^2	p<0.01
1	Extraneous Items	19 (20.4)	0 (0)	15 (7.4)	0 (0)	34 (6.8)	42.65	p<0.001
2	Predominance of stereotypes	1 (1.1)	0 (0)	15 (7.4)	1 (0.8)	17 (3.4)	17.02	p<0.001
3	Influence of previous knowledge	6 (6.5)	14 (17.1)	39 (19.3)	37 (29.6)	95 (19.0)	18.75	p<0.001
4	Confusion of word meanings	1 (1.1)	1 (1.2)	2 (1.0)	9 (7.2)	13 (2.6)	14.04	p<0.01
5	Discrimination errors	5 (5.4)	6 (7.3)	0 (0)	0 (0)	11 (2.2)	21.78	p<0.001
6	Disregard of stated facts	20 (21.5)	23 (28.0)	131 (64.9)	71 (56.8)	245 (48.8)	65.89	p<0.001
7	Literal information	4 (4.3)	11 (13.4)	0 (0)	4 (3.2)	19 (3.8)	29.01	p<0.001
8	Reproduction	20 (21.5)	0 (0)	0 (0)	0 (0)	20 (4.0)	91.61	p<0.001
9	Justification	6 (6.5)	7 (8.5)	0 (0)	0 (0)	13 (2.6)	25.69	p<0.001
10	Transposition	11 (11.8)	20 (24.4)	0 (0)	3 (2.4)	34 (6.8)	62.53	p<0.001
	Total	93 (18.5)	82 (16.3)	202 (40.2)	125 (25.0)	502		

Figures in brackets indicate percentage of total errors and whole numbers indicate actual number of occurrences.

TABLE 30

Number of errors made by urban group arranged in categories according to mode of presentation.

Cat. No.	Name of Category	MODE OF PRESENTATION: Free Writing	Directed Writing	Free Drawing	Directed Drawing	Total	χ^2	p<0.01
1	Extraneous Items	27 (21.6)	2 (1.9)	25 (12.3)	1 (0.8)	55 (9.7)	41.33	p<0.001
2	Predominance of stereotypes	6 (4.8)	0 (0)	12 (5.9)	4 (3.1)	22 (3.9)	7.13	NS
3	Influence of previous knowledge	14 (11.2)	14 (13.0)	39 (19.2)	40 (30.5)	107 (18.9)	18.92	p<0.001
4	Confusion of word meanings	4 (3.2)	4 (3.7)	1 (0.5)	18 (13.7)	27 (4.8)	32.38	p<0.001
5	Discrimination errors	2 (1.6)	15 (13.9)	0 (0)	0 (0)	17 (3.0)	55.21	p<0.001
6	Disregard of stated facts	11 (8.8)	38 (35.2)	126 (62.1)	67 (51.1)	242 (42.7)	96.16	p<0.001
7	Literal information	7 (5.6)	8 (7.4)	0 (0)	1 (0.8)	16 (2.8)	19.72	p<0.001
8	Reproduction	30 (24.0)	0 (0)	0 (0)	0 (0)	30 (5.3)	112.01	p<0.001
9	Justification	8 (6.4)	0 (0)	0 (0)	0 (0)	8 (1.4)	28.69	p<0.001
10	Transposition	16 (12.8)	27 (25.0)	0 (0)	0 (0)	43 (7.6)	79.00	p<0.001
	Total	125 (22.0)	108 (19.0)	203 (35.8)	131 (23.1)	567		

Figures in brackets indicate percentage of total errors and whole numbers indicate actual number of occurrences.

TABLE 31

Totals of errors arranged by age and text made by experimental group.

Class		Text	Category No. 1 Extraneous items	2 Predominance of stereotypes	3 Influence of previous knowledge	4 Confusion of word meanings	5 Discrimination errors	6 Disregard of stated facts	7 Literal information	8 Reproduction	9 Justification	10 Transposition	Total	
Primary	IV	Train	16	6	6	0	0	48	2	0	2	0	80	
		Feast	5	0	31	5	2	14	0	5	3	9	74	
		Dragon	4	3	3	0	3	42	7	7	7	8	84	
		City	8	2	21	8	1	26	1	7	4	9	87	
		Total	33	11	61	13	6	130	10	19	16	26	325	325
Primary	V	Train	2	2	4	0	0	40	0	3	0	2	53	
		Feast	9	0	23	1	0	27	2	2	0	6	70	
		Dragon	5	0	3	1	5	44	5	4	1	8	76	
		City	2	3	10	7	1	25	0	2	1	1	52	
		Total	18	5	40	9	6	136	7	11	2	17	251	251
Primary	VI	Train	4	3	8	0	0	32	1	0	1	1	50	
		Feast	7	0	28	0	0	17	1	1	1	1	56	
		Dragon	4	2	3	1	2	46	2	6	0	10	76	
		City	3	6	13	7	6	24	1	2	0	4	66	
		Total	18	11	52	8	8	119	5	9	2	16	248	248
Primary	VII	Train	2	0	7	0	0	24	0	0	1	1	35	
		Feast	8	1	30	0	0	13	3	2	0	2	59	
		Dragon	7	3	6	3	6	36	7	7	0	13	88	
		City	3	8	7	7	2	29	3	2	0	2	63	
		Total	20	12	50	10	8	102	13	11	1	18	245	245
		Overall Total												1069

TABLE 32

Totals of errors arranged by age, ability and location made by experimental group.

Class		Category No. 1 Extraneous items	2 Predominance of stereotypes	3 Influence of previous knowledge	4 Confusion of word meanings	5 Discrimination errors	6 Disregard of stated facts	7 Literal information	8 Reproduction	9 Justification	10 Transposition	Total	
Ability Groups	PIV+	6	3	32	8	3	66	4	5	0	14	141}	325
	PIV-	27	8	29	5	3	64	6	14	16	12	184}	
	PV+	6	1	22	2	4	35	3	4	2	8	87}	251
	PV-	12	4	18	7	2	101	4	7	0	9	164}	
	PVI+	8	7	20	4	3	59	0	7	1	5	114}	248
	PVI-	10	4	32	4	5	60	5	2	1	11	134}	
	PVII+	6	6	27	1	5	43	5	0	4	10	107}	245
	PVII-	14	6	23	9	3	59	8	7	1	8	138}	
Location	PIV Rural	4	3	24	3	3	65	5	9	11	8	135}	325
	PIV Urban	29	8	37	10	3	65	5	10	5	18	190}	
	PV Rural	12	2	16	0	2	76	4	2	0	5	119}	251
	PV Urban	6	3	24	9	4	60	3	9	2	12	132}	
	PVI Rural	7	5	29	2	3	58	3	2	2	10	121}	248
	PVI Urban	11	6	23	6	5	61	2	7	0	6	127}	
	PVII Rural	11	7	27	8	3	46	7	7	0	11	127}	245
	PVII Urban	9	5	23	2	5	56	6	4	1	7	118}	
	Overall Total												2138

TABLE 33

Totals of errors arranged by age and mode of presentation made by experimental group.

		Category No. 1	2	3	4	5	6	7	8	9	10	
Class		Extraneous items	Predominance of stereotypes	Influence of previous knowledge	Confusion of word meanings	Discrimination errors	Disregard of stated facts	Literal information	Reproduction	Justification	Transposition	Total
Free Writing	PIV	18	2	6	2	2	6	3	19	9	8	75
	PV	5	1	3	1	1	9	2	8	2	7	39
	PVI	9	1	6	1	2	9	2	12	2	6	50
	PVII	14	3	5	1	2	7	4	11	1	6	54
	Total	46	7	20	5	7	31	11	50	14	27	218	218
Directed Writing	PIV	1	0	11	4	4	25	6	0	7	15	73	
	PV	0	0	4	0	5	13	4	0	0	10	36	
	PVI	1	0	6	0	6	12	2	0	0	10	37	
	PVII	0	0	7	1	6	11	7	0	0	12	44	
	Total	2	0	28	5	21	61	19	0	7	47	190	190
Free Drawing	PIV	13	5	21	0	0	64	0	0	0	0	103	
	PV	13	3	22	1	0	71	0	0	0	0	110	
	PVI	8	10	14	0	0	70	0	0	0	0	102	
	PVII	6	9	21	2	0	52	0	0	0	0	90	
	Total	40	27	78	3	0	257	0	0	0	0	405	405
Directed Drawing	PIV	1	4	23	7	0	35	1	0	0	3	74	
	PV	0	1	11	7	0	43	2	0	0	0	64	
	PVI	0	0	26	7	0	28	0	0	0	0	61	
	PVII	0	0	17	6	0	32	2	0	0	0	57	
	Total	1	5	77	27	0	138	5	0	0	3	256	256
	Overall Total												1069

TABLE 34

"Parroting" – direct quotes from text.

	Words Quoted	Words in Passage	Subjects Using Passage	Possible Quoted	% Quoted
Train	448	119	40	4760	9.41%
Feast	812	119	40	4760	17.05%
Dragon	727	119	40	4760	15.27%
City	712	119	40	4760	14.9%
Total	2699	476	160	19040	14.18%

TABLE 35

Omissions in directed drawing.

	Possible Illustrations	Omissions	% Omissions
Train	360	52	14.4%
Feast	440	123	28.0%
Dragon	640	112	17.5%
City	520	79	15.2%
Total	1960	366	18.7%

The details most often omitted were the more unusual words or these which have two or more meanings, possibly metaphorical e.g. 'rang' in the phrase "the longhouse rang". Frequently omitted were 'Astrid', 'domes', 'temples', 'warriors' and 'costly' which referred to the dragon's bed.